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"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.

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THE ELEVATION OF SITES FOR BATTERIES.

By Major JOHN G. D. KNIGHT, Corps of Engineers, U. S. A.

WHAT should be the proper elevation of a sea-coast battery cannot be determined without considering the fire to which it will be exposed and that which it may return; not the weight of projectiles but more especially the angles at which they will arrive at their targets and certain functions of those angles.

I. This requires at once some assumption as to the ranges at which batteries may expect to be attacked.

During the English naval manœuvres of 1890, the first rule for engaging was "Fire is not to be opened or continued at a greater distance than 4000 yards."

During those of 1893, when the fleets went into action, "the leaders were then passing in opposite courses, port to port, distant about a mile, fire from main and secondary guns being opened as each vessel came into range of an opponent." Later they engaged when about three-fourths of a mile distant.

In the French manœuvres of 1893, "ships were always to be considered as in action when they were within 3280 yards of one another." At the close of these manœuvres three vessels steaming at 10 knots, fired at the summit of Cape Rosso, distant 8750 yards with 14 and 16 cm. guns; and six battle-ships, steaming at

The article, "Elevation of Sites for Batteries," by Major Knight, Corps of Engineers, is published by courtesy of the Chief of Engineers, U. S. Army.

8 knots fired at a range of 3800 yards with all their guns. Finally the first three fired at a target 8750 yards distant, while steaming at 10 knots in the arc of a circle of which the target was the centre. "The results are said to have been only moderately satisfactory."

In the English manœuvres of 1894, it was ruled that an enemy's ship coming within 6000 yards of the entrance to a fortified port was to be out of action for twenty-four hours. One engagement began at 4000 yards range.

The distances at which the forts of Alexandria were attacked by the English fleet varied at first from 1000 to 3800 yards.

At Sfax the French ironclads were stationed at from 7000 to 4300 yards, boats being at "a few hundred yards." "After a remarkably deliberate fire of 2000 projectiles, delivered under peace practice conditions, the 'defensive power' of the place is reported to have been 'practically uninjured.'"

Sir Andrew Clarke, Inspector General of Fortifications, in this connection stated: "It will need a great deal of shooting from the gun vessels before a shore gun is grazed, and the ironclads will do no harm at all to the defenses."

In the battle of the Yalu, September 17, 1894, the Chinese opened fire at distances of from 5500 to 6500 yards; the Japanese replied at 3300 yards. The battle was fought in general at ranges of from 2000 to 3300 yards.

The cases above cited lead to the conclusion that it is not probable that a naval attack of land batteries will be entered upon at distances exceeding 5000 yards.

It is not asserted that cities, dockyards and large harbors densely occupied, may not be bombarded from distances exceeding 5000 yards; but the probable damage to batteries from attack at the same distances will not justify the expenditure of ammunition.

II. From the ballistic curves computed under the direction of The Board of Engineers in 1885 for the 40 cm. Krupp B. L. Rifle and in 1892 for the U. S. 8- and 10-inch B. L. Rifles, the following table has been prepared:

ANGLES OF FALL, DEGREES.

Ranges, yards.	8-inch guns.	10-inch guns.	40 cm. guns.
1000	0.7	0.8	0.6
2000	1.5	1.8	1.6
3000	2.6	3.0	2.5

4000	3.9	4.4	3.7
5000	5.7	6.1	4.9
Initial velocity per second,	2160	1960	2035

It is assumed that batteries will not be the targets for projectiles having greater angles of fall than those given for the 10-inch rifle. Should vessels be armed with guns mounted for curved fire, overhead protection may be required for land guns, since increased elevation of site will in itself give no increased protection against such fire.

In batteries where the guns are mounted on Buffington-Crozier carriages and are not to be fired at angles of depression, the gun after recoil, lies wholly below a plane which passes through the interior crest and is depressed 7° below a horizontal plane. In other words, the gun after recoil, could not be hit by projectiles clearing the interior crest and having angles of fall of less than 7°. Briefly, the gun may be said to be under a 7° plane. This plane passes 5′ 11″ above the front edge of the loading platform and 4′ 4″ above the extreme rear edge.

When a 10-inch rifle is mounted on a Gordon carriage, it is under a 13° plane after recoil and while being loaded at an elevation; and under a 10° plane while being loaded in a horizontal position. This 10° plane passes 5′ 10″ above the front edge of the loading platform and 4′ 3″ above the extreme rear edge.

The 12-inch rifle mounted on the lift, when the lift is completely lowered, lies under a 15.5° plane, and the rear upper edge of the pit lies under a 9° plane. The 15.5° plane passes about 8′ above the floor of the loading passage at the ammunition hoist.

The greatest angle of fall of projectiles for a range of 5000 yards given in the table above is 6.1°; hence neither guns mounted on the types of carriages mentioned or on lifts, nor the carriages or lifts, will be struck by projectiles passing above interior crests where ranges are 5000 yards and less, and the fire is direct, *even though the crest of the land battery is at the level of the attacking naval battery.*

As these shot will pass at least 5′ 6″ above the rear edge of the loading platform of the 10-inch Buffington-Crozier carriage and about 7′ above the front edge, the gun detachment will be fairly covered from them. Where guns are mounted en barbette on non-disappearing carriages, both gun and loading detachment

are almost wholly above the level of the interior crest. In one case where a 12-inch gun has been so mounted, the loading platform is about three inches above the level of the interior crest.

III. To what extent will the protection of guns and gun-detachments be increased by selecting elevated sites for batteries?

The following table shows the heights at different ranges giving corresponding reductions of the angles of fall of arriving projectiles, with corresponding theoretical vertical increase of protection of loading detachment, 45 feet in rear of crest, this distance being approximately the distance of the rear edge of the loading platform from the interior crest.

Angle of fall diminished in degrees.	Theoretical vertical increase of protection in inches, 45′ from crest.	At ranges in yards. 1000	2000	3000	4000	5000
		Elevation above naval guns in feet.				
1	9	52	105	157	209	262
2	19	105	210	314	419	524
3	28	157	314	472	629	786
4	38	210	420	629	839	1049
5	47	262	525	787	1050	1312

It is apparent at once that against fire from vessels a mile or more distant, no moderate increase in the elevation of the site of a battery will give much increase in protection. But such slight protection of loading detachment as is given is largely theoretical, for elevations corresponding to the greater reductions in the angle of fall. As the elevation of the site is increased, so it must generally be possible to increase the angle of depression under which its guns may be fired. When this angle of depression is 5°, the platform of the 8-inch is 11 inches higher relative to the interior crest than when the gun is to be fired without depression; and that of the 10-inch gun 12.5 inches; the net increase of protection of loading detachment due to elevation of site in these cases is 36 and 35 inches respectively. This is the increased protection afforded at a distance of forty-five feet in rear of the crest 262 feet above the guns of a vessel 1000 yards distant. If the range be doubled or trebled, the crest elevation must also be doubled or trebled, not to obtain *more* than 36 inches additional protection, but to retain that increase. The explanation of this is that each increase in the elevation of the site requires the loading platform to be raised nearer the level of the interior crest in order that the land gun may be fired at increased angles of depression. Otherwise dead

angles would be developed in front of a battery in proportion to the increase in the elevation of its site.

The second table gives what may be called the searching effect of projectiles and the elevation of site that will neutralize this effect. Thus a projectile having an angle of fall of 1° just clearing the interior crest will, at a distance of forty-five feet to the rear pass nine inches below the crest. This is the angle of fall of projectiles fired at a range of about 1000 yards.

What elevation of the battery site will neutralize this angle of fall, or cause the path of the projectiles on arrival to be horizontal?

The table shows that an elevation of 52 feet is necessary.

For ranges of about 2000 yards the angle of fall will be about 2°, and the projectile will pass 19 inches below the crest. To neutralize this fall, the elevation of the site must now be 210′, and so on, until a projectile fired at a distance of between 4000 and 5000 yards having an angle of fall of about 5° will pass 47 inches below the interior crest. To neutralize this the site must have an elevation of over 1000′.

IV. To what extent will the field of fire of the battery be restricted by elevating its site?

These different elevations have reduced the angles of fall of arriving projectiles to 0° and have thus neutralized their searching power.

But what has been the effect upon the land guns, of thus elevating the battery site?

These guns are mounted on carriages allowing the guns but 5° depression; hence they can not be used against vessels at ranges requiring them to be depressed more than 5°.

A 10-inch rifle firing over a crest 300 feet above the water will have a dead zone whose radius is about 1000 yards; one firing over a crest whose elevation is 210 feet will have a dead zone of about 720 yards radius.

V. It has been shown that a gun mounted on either of three disappearing plans, will not be directly hit when under direct fire of guns at ranges not exceeding 5000 yards; that the additional protection arising from the tabulated elevations of site is both unnecessary and slight for guns thus mounted, and is practically nothing for non-disappearing barbette guns; and that moderate elevations of site result in dead zones which should not be disre garded. Still there seems one reason why sites should be chosen

having more elevation than that of naval guns. With nothing but the parapet continuously in an enemy's view, with guns appearing only for brief periods, he must be at a loss how to direct his fire if he can not see the openings into which the gun disappears. Therefore, with the object of depriving an enemy of a definite target for his guns, the battery may well be constructed at sufficient elevation to hide the openings of its emplacements from view from the tops of an enemy's vessel. For this purpose, and for this only, it may be well to give crests of batteries an elevation of about 100 feet above the water.

As the loading platforms of barbette guns on non-disappearing carriages are about on the level of the interior crest, even when the site of the battery is about 300 feet high, it is evident from the table given that the service of these guns without shields demands much exposure of gunners no matter what reasonable elevation the batteries may have.

VI. So far shell and shrapnel have not been considered. With even the low remaining velocity of 1200 feet, but .04 of a second would be required for a shell to pass from the interior crest to the rear of the emplacement. It is hardly too much to say that the time fuse could not be cut with the accuracy necessary to insure the burst of the shell at some point of its passage over the gun and its gunners. At the Inchkeith experiments in 1884, firing was carried on against a model gun emplacement and dummy gunners. Thirty rounds of shrapnel fired from a 10-inch gun at an excellent target and under exceptionally favorable circumstances resulted in four of the dummies being hit; the target gun was still perfectly capable of being worked. Some years ago French vessels did not carry shrapnel for heavy guns.

If direct hits can be guarded against, and thus the action of percussion fuses prevented, shell and shrapnel need not be feared where guns are mounted on disappearing devices.

VII. Certain disadvantages have been attributed to low sites.

a "They afford no direct fire upon the deck of a ship, which being her most vulnerable point, should always be attacked."

For equal ranges the angles of fall for the land guns would be increased only as little as those of the naval guns would be decreased for corresponding elevations of site.

Lieut. E. W. Very, U. S. N., asserts that 2-inch steel plates *well supported against flexure*, will give good resistance at angles

up to 9°, and possibly 10°. The angles of fall of heavy projectiles for ranges up to 3000 yards do not exceed 3°. Were the elevation of the battery site increased to such an extent as to increase these angles of fall by 5°, a well-supported, flat 2-inch steel deck will still give good resistance at these ranges. The second table given above shows how great are the elevations necessary to give this increase to angles of fall, an increase still insufficient to cause the deck to be penetrated. A slight roll of the vessel may offset the small change in the angle of fall due to increased elevation of battery site; on the other hand, such a roll may unfavorably expose the deck to shot from a low battery.

b A low site "enables ships to dispense with high angles of fire, for which the mode of mounting their guns in a measure disqualifies them."

For neither of the U. S. guns above mentioned, do the angles of elevation corresponding to ranges of 5000 yards exceed 5°. For the ranges and elevations of site above tabulated, additional elevations of the naval guns do not exceed 5°.

The maximum elevation of the piece then for attacking batteries with the elevations of site and ranges given, will be under 10°.

The maximum practicable elevation for guns on shipboard being from 13° to 15°, it appears that the attack of batteries on sites of the elevations given above, does not demand impracticable angles of fire for naval guns at reasonable ranges.

c "It places the hostile guns on shipboard on an equality with land guns as to energy of impact." As illustration, attention is called in the text from which this is quoted to the 16-inch rifle firing a one-ton projectile from a bluff 200 feet high and a ship firing projectiles of like weight at the battery; the ship being thus handicapped 400 foot tons. Still the land gun has gained only 200 foot tons by the elevation of the battery site, or about one-half of one per cent. of its striking energy at a range of two miles.

If a 714 lbs. shot be fired from a ship at 3000 yards range at a battery elevated 1270 feet, and another shot of the same weight, fired from the battery at the ship, the respective striking velocities would be 1474 and 1517 feet per second,* and the respective striking energies 10,754 and 11,390 foot tons; the vessel in this case would be handicapped 636 foot tons.

* Ingalls.—"Hand-Book of Problems in Exterior Ballistics," pp. 86–88.

But the gun has only gained 3 per cent. of energy by reason of its elevated emplacement.

If a blow 11,100 foot tons would not damage a steel deck, would one of 11,400 be likely to do so?

The authority urging the above objections concludes the subject with this statement. "Even at Fort Mex, a low work at Alexandria, out of 920 shots fired at 14 guns practically *en barbette* by five armored ships at ranges from 1000 to 3800 yards, two land guns were grazed but none were disabled by direct hits; and only direct hits can place a gun properly mounted on a bluff, *hors de combat*."

So far as this action throws light on this subject, the only disadvantage entailed upon Fort Mex by its crest being less than 30 feet above sea level was that two guns out of fourteen were grazed: even though low, its guns escaped direct hits.

Conclusion. Assuming that vessels will not attack batteries at greater ranges than 5000 yards, barbette guns mounted according to any of the disappearing methods adopted by the United States need no additional protection derived from increasing the elevation of battery sites within reasonable limits. Even moderate elevations of batteries, which are armed with guns limited to depression of 5°, entail dead zones of magnitude not to be overlooked where these zones include areas of deep water.

Disappearing guns gain but little additional protection by such increase in the battery elevation, and non-disappearing guns gain therefrom practically no additional protection.

Therefore, unless justified by motives of economy barbette guns should not be mounted on non-disappearing carriages even on elevated sites. The special advantage of elevated sites for batteries of disappearing guns is that they put obstacles in the way of an enemy seeking to locate the guns. This advantage will be secured if the battery crest have an elevation of about 100 feet.

NOTES ON THE PREPARATION OF THE INFANTRY SOLDIER.*

By 1st Lieutenant CHARLES H. MUIR, 2d U. S. Infantry.

TO prosecute a war, either offensive or defensive, to a successful end requires something more than an abundance of intelligent, brave and well-instructed soldiers. These soldiers must be armed and equipped, clothed, fed, and paid; and the resources of even the most powerful state are severely taxed by a war of but short duration. The tax will be heavy even though the state be found well prepared at the beginning of the struggle; and when the amount of money expended on a military establishment in time of peace is added to the greater outlay necessary in time of war, the necessity of economy becomes apparent. If it be the military policy of a state to maintain in peace only a small military establishment, trusting to the efforts of this small force, aided by such additions and expansions as can be quickly made through the means provided for such emergency, to check the first onset of an invading army, and thus allow the raising, arming, equipping, and training of a force sufficiently large to issue from the conflict without discredit, loss of time will entail the most serious consequences.

Infantry "is more easily equipped, more quickly made efficient, and is more nearly independent than any other arm," and it follows, if for no other reasons than those stated, that the proportion of infantry in modern armies is necessarily great, and will probably increase as the cost of the maintenance of armies, and the prosecution of wars becomes greater.

The preparation of the infantry soldier, therefore, while less comprehensive than that of the cavalry soldier, and omitting things necessary for service in the artillery, is of the utmost importance, both by itself and because it involves so much of the essentials to service in the other arms. A soldier well trained in

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one arm is much sooner made efficient in any other arm than is a person without any military training.

The Personnel.—The authority to obtain the personnel to prepare, is found in Art. I, Sec. 8, cl. 12 of the Constitution. In the exercise of this power, Congress, in effect, leaves the quality of the personnel to depend on the volition of those who voluntarily present themselves, and the judgment of those whose duty it is to pass upon the fitness of the personnel presented. In other words, the quality of the personnel depends on the inducements offered men to enlist. The number of men presented increases with the inducements offered, and the greater the number, the easier will it be, other things remaining equal, to obtain a suitable personnel.

The inducements referred to are various, and include pay, treatment, work, food, clothing, and many others, some apparent, others obscure. Not the least among them is the manner in which those composing the chosen personnel are treated and regarded by the great mass of the civilian population. An occupation favorably regarded by the majority of people will attract more and better men than an occupation more remunerative but less respected. It follows, therefore, that any means, in itself harmless, that will increase the respect accorded the soldier by his comrades and by civilians, is important.

Two considerations, both relating to the uniform, present themselves in this connection. The first has been often recommended, and is to the effect that the uniform of the soldier should not be seen on military convicts serving sentence at military posts. The second consideration is to change from a privilege to a requirement the permission accorded the soldier to appear in civilian garb when absent from his post by proper authority. It seems possible to make it a privilege for the soldier to wear the uniform whenever he is absent from his proper station, to be granted to those only whose conduct is known to be such as to command respect. Let it generally be known that persons, appearing under such circumstances in the uniform of a soldier, are men trusted by their superiors to do nothing that will in any manner detract from the standing of the class to which they belong, and it becomes a privilege to appear so clad. Let the mass of civilian population once become impressed with the fact that men so clad uniformly conduct themselves in a self-respecting manner, and it can scarcely be doubted that a long step

will have been taken to advance the regular soldier in the estimation of the public.

Persons appearing in public places in an intoxicated or semi-intoxicated condition, indulging in profane or obscene language, presenting a disreputable appearance, soiling the floors of public buildings and vehicles with tobacco juice, and conducting themselves generally as hoodlums, are properly regarded as such by the better class of observers. When the persons so offending show by uniform or other distinctive mark that they belong to a special class, no matter how small a proportion of that class they form, they injure its standing beyond the power of the good behavior of the larger proportion of that class to remedy.

Company Officers.—The field of instruction is the company; and upon the ability and industry of the company commander depends much of the future value of those who, at different times, are under his tuition, whether as privates, non-commissioned or commissioned officers. It is true that in all armies the captain is to be assisted in his duties by the lieutenants of the company; but in the larger companies of European armies, with the great number of recruits constantly under instruction, more depends on the subordinates than in the small companies, troops, and batteries of our army.

This incidentally leads to the idea that the many years service of American officers as lieutenants could, with profit, be proportionally divided among the three arms, and yet allow troops, batteries, and companies to be properly instructed. It is believed that such a system would have many positive advantages, among which may be mentioned the practical knowledge acquired of the powers and limitations of the three arms. It would also do much towards preventing a vicious over-confidence in one's own arm, occasionally possessed, and falsely regarded as *esprit de corps*, that is liable to lead to serious disaster.

Objects of Preparation.—Assuming that the proper personnel has been obtained, the objects of the preparation are twofold: first, the performance of duty in the present; second, the performance of duties in the future. The two phases, however, blend in one, for it is always a present duty to be prepared for emergencies.

It is desirable that all the soldiers be brought on the field of battle in good physical condition, and ready to perform the part that falls to their lot. The first requires that each individual sol-

dier should know how to march, to bivouac, to care for his clothes, and to exercise judgment in matters connected with his food. The second requires that he be well disciplined, well instructed in the use of his weapon, in such drill movements as are necessary to the manœuvring and placing of the organization to which he belongs, and in the elements of the service of security and information.

Marching.—The difficulties of marching troops unprepared through lack of practice are great, even when the attending circumstances are favorable. If the circumstances be unfavorable, a short period is sufficient to reduce the efficient strength. The greatest difficulty appears to be connected with the feet and their coverings.

The stockings used by American soldiers would be wool, cotton, or merino, and their proper fit is as important as in case of shoes. The best fitting shoe fails to keep the foot in good condition if the stocking is so loose as to be in folds, or so short as to cramp the toes; and many a sore foot charged to a poor shoe, is really caused by an ill-fitting stocking.

A woollen stocking has the advantage, possessed in a less degree by the merino, and lacking in the cotton, of forming an elastic cushion for the foot, and thus protecting it from the friction of intact shoes, and the bruises arising from the inequalities that sooner or later appear in the best of shoes during hard marching. Wool, however, is not suitable to all feet.* It is believed that a proper knowledge of the use of woollen stockings would increase the proportion of feet to which they are suited.

The good shoe is easy to define,† but hard to procure. The greatest trouble results whenever an attempt is made to fit the foot to the shoe. Shoes are manufactured in a sufficient variety of forms to fit normally formed feet, but when shoes are supplied by contract, the number of forms is too limited to ensure entire satisfaction. It is suggested that if the soldiers of a company could purchase their own shoes, and did purchase them with the knowledge that any unfitness would result in their own discomfort, developed during frequent practice marches, each would soon find the form of shoe best adapted to his foot. Having procured such a shoe, the care of the feet is much simplified. We will suppose such a shoe obtained, and that it is the intention to wear

* Woodhull's "Military Hygiene," p. 32.

† *Ibid.*

woollen stockings. The warmth of these stockings renders undesirable the retention of the leggings in warm weather.* The greater part of their advantages could be secured by arranging the bottoms of the trousers to lace up something in the manner of the present leggings. As soon as a camp is reached, the stockings and shoes worn during the march are removed and allowed to become thoroughly dry before the time of the next march, the soldier's feet meanwhile being protected by a pair of barrack or other light shoes carried by the soldier. Such a method, accompanied by frequent bathings, daily if possible, will be found to give favorable results in the majority of cases.

It is not, however, urged that the pair of barrack shoes is to be carried in addition to, but in lieu of, the extra pair of campaign shoes now supposed to be carried, for the weight is already too great. To replace such extra pair of campaign shoes, a cobbler might be employed to accompany each battalion, with a pack animal to carry tools and materials necessary. The advantage to the soldiers in weight carried would be by no means inconsiderable.

Practice Marches.—No matter how good the foot gear may be, and how much care is taken of the feet, men can be kept fit to march only by being kept in practice; and no amount of drill and gymnasium exercise can take the place of frequent practice marches, carried out under conditions assimilated as nearly as possible to those of a campaign. During such practice marches the expedients by which the soldier can diminish the discomforts of bivouac and probabilities of disease can be taught, habits of caring for clothes established, and knowledge in matters connected with food acquired.

The expedients referred to relate to shelter from the elements, an increase of warmth to the shelter, and a more comfortable and healthy bed than that of the blanket and bare ground. It would require but one experience to impress on the minds of American soldiers the contrivances by which a better instructed comrade had increased his own comfort and made their discomfort the more apparent. After suffering all night from a searching wind they would fully appreciate the value of windbreaks† made by throwing up mounds of earth, piling boughs against a supporting

* Their further undesirability is set forth in Woodhull's "Military Hygiene," page 31, and Pratt's "Précis of Modern Tactics," page 127.

† Beach's "Manual of Military Field Engineering," p. 207.

pole, or weaving a rough matting of brush or weeds. One night passed trying to avoid the hummocks that seem to increase in size and hardness as the night progresses, would suffice to make him follow the example of a comrade who had more carefully prepared a bed by levelling off such hummocks, softened it by the addition of a few dry leaves, weeds, etc., or, still better, had made himself a comfortable, dry, resting place with the aid of boughs, decreasing in size towards the top, and finished off with small twigs, dry weeds, or other materials available.

While not so apparent, it can yet be made to appear during such practice marches that the indiscriminate drinking of water on the march is injurious and unnecessary, except when the perspiration is so excessive as to demand the introduction of water into the system. If once a man becomes aware that by carrying a pebble in his mouth,* or by occasionally chewing a piece of stick or a bit of gum, he renders it unnecessary to weight himself down with a canteen of water, he will, in general, profit by such knowledge.

Every effort should be made to impress upon the men the advantage of replacing drinking water by coffee or tea,† and the great danger that lies in drinking water from indiscriminate sources. It is difficult for a thirsty man to abstain from satisfying himself at any clean appearing water at hand, and, when that water is cold, the temptation is rarely withstood. Especially in campaigns, such indulgence will frequently expose the person to typhoid fever, cholera, and other disease; and when it is considered that by replacing such water by tea or coffee, or by boiling it in a tin cup at the camp fire, the disease germs are rendered inert, it is seen that a little care in this respect is repaid a thousand fold.

In matters of food proper the infantry soldier must depend largely upon the intelligence, skill, and integrity of those whose duty it is to keep him supplied. There are, however, a few minor points in which the soldier can improve the food he may sometimes be forced to eat, render it more appetizing, and consequently get greater benefit from it.

Bread, so old as to be scarcely edible, and so sour as to be positively injurious, can yet be rendered wholesome and palatable

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*Woodhull's "Military Hygiene," p. 103.

† *Ibid.*

by toasting it at a camp fire.* Even when mouldy it can in this manner be so improved as to lose a large share of its distastefulness and become a boon to a hungry man. The monotony of a hard bread diet can be varied by soaking the bread in water, and then toasting it as above.

In clothes, as in food, the soldier will have to depend mainly on those who supply him and the improvement in his power will consist mainly in keeping his garments clean and in repair. It is therefore desirable that the soldier be required during a part of his service to launder his underwear and to repair the same. A small package containing needles, buttons, and thread, could be easily carried in the soldier's pocket, and an ability to use its contents would prolong the life of the garments, to the increase of the soldier's comfort, health, and efficiency.

The foregoing is made up of small items; but history shows that the neglect of them is responsible for an aggregate of deaths far in excess of those resulting from injuries on the field of battle.

Discipline.—"Discipline is that quality possessed by efficient soldiers which causes each to appreciate and accept without question the powers and limitations of his rank, which inspires each with confidence in the military stedfastness of his comrades, and makes obedience to his lawful superiors a second nature."†

When any command displays many of the good, and but few of the poor qualities, it is spoken of as being well disciplined, sometimes without due weight being given to the attendant circumstances. It cannot be denied that the bearing of the same body of troops will vary greatly with these circumstances. Of two organizations containing equally good personnel, one may at the expiration of a certain period, be in a much more satisfactory condition than the other as regards discipline, solely through a more judicious use of punishments and rewards; or, in case equal judgment has been shown in this respect, the same relative condition may result from the better physical condition resulting from knowledge of those expedients relating to camp, marches, and food, previously mentioned. A soldier suffering from galled feet resulting from his being furnished with and compelled to wear an ill-fitting shoe, or one suffering from rheumatism due to sleeping on the damp ground, is in a much less tractable frame of mind than the one in good physical condition.

* Woodhull's "Military Hygiene," p. 59.

† Wagner's "Organization and Tactics," p. 38.

Drill.—Intimately connected with and, indeed, forming part of the discipline of the troops, is the question of their instruction under the Drill Regulations.

The most important parts of such regulations, as far as the private is concerned, are "The School of the Soldier," "School of the Company," and the "Squad" in "Extended Order." In these parts is found the information necessary to enable him to play his part, indicated to him by the proper officer or non-commissioned officer, in the ceremonies and drills of larger organizations.

Setting-up Exercises.—The value of these exercises is found in their effect on the health and appearance of the subject. They take the place of more important military exercises when such exercises are interfered with by inclement weather; straighten and expand various parts of the body to the increase of a feeling of vigor and pride of appearance; and, possibly, have a value in causing a feeling of proprietary pride in the army on the part of those who maintain it.

Manual of Arms.—The Drill Regulations, paragraph 44, recognize that the aim of instruction is to make the soldier familiar with his weapon. It says "The recruit should as soon as possible be taught the use of his rifle, its care and preservation." This idea should be prominent in all the preparation of the infantry soldier. No matter how well he marches, how well he can care for himself, or how well disciplined he may be, his value on the field of battle depends on his knowledge of and ability to use his weapon. Without such knowledge and ability his value in such position would depend merely on the effect of his presence, increased by the noise he could make, and chance shots delivered by him. In a short time this value would be more than counterbalanced by his effect on the enemy's *morale*, which would be raised by the evidence of his inefficiency.*

Besides making the soldier feel more at home with his weapon, the manual of arms has a value in making concerted action a part of the soldier's second nature, and in instilling in him habits of precision. It is not, however, advocated that time and attention be devoted to the manual to the exclusion of other matters.

Bayonet Exercise.—Exercises in bayonet drill find their value in the fact that, while increasing the soldier's confidence in himself and familiarity with his weapon, they constitute good gym-

* "Organization and Tactics," p. 306.

nastic exercise, and, like the manual, instill habits of concerted action in prompt obedience to the command. Like the manual, however, they should not be allowed to exclude more important matters of instruction.

The Squad in Extended Order.—In accordance with the belief in the necessity of extended order on the battle field, the Infantry Drill Regulations, par. 503, say: "This instruction on account of its importance will be given as soon as the recruits have had a few drills in close order. The mechanism of the movement is taught on the drill ground with every attention to detail; afterward the movements are executed on varied ground, making use of the accidents of the surface for cover and observing the conditions of battle." In other words, the chief end of the soldier's instruction is to prepare him for his part on the battle field; and parade movements, whether in drill or ceremonies, are incidental and subordinate thereto.

"The squad is the basis of extended order," and implies a leader to direct and control, and members to obey. Besides directing and controlling their squads, the leaders form the connecting link between the squad and the leader of the next higher group, and when it is considered that the control or the lack of control of a single squad may insure the continued advance, or cause the disorderly retreat of that portion of the line in which it is, with the attending effect on the adjacent portions of the line, the necessity of trained leaders of squads (as well as squads trained to obey the direction and coutrol of such leaders) becomes apparent. So great, indeed, is this necessity, that the question naturally arises whether the size of squad is not so small as to require an excessive number of such leaders for the resulting great number of squads.

The instruction starts with the details of the movements on the drill ground; and, as in other matters, there is too strong a tendency to dwell upon this portion, which may be regarded as composed of normal formations and movements. As in other matters, the chief value of knowing, and even of having, the normal, is that such knowledge enables the formations and movements to be the more easily suited to circumstances by wise departure from the normal. If too much time be spent in this preliminary portion, the impression is created that proficiency in the normal is all that is really necessary, and that instruction and practice under conditions assimilated as nearly as possible to

those of the battle-field are more in the nature of amusements.

Another undesirable result is to cause a feeling of too great independence of squads. It is not denied that the squad is the basis of extended order, but it is believed that the squad is such basis for purposes of control more than for purposes of direction; the squad leaders' duties, after having instructed their squads, being mainly to insure the execution of orders affecting their squads, and, above all, to enforce fire discipline. The position of these squad leaders in the deployed line of skirmishers, when their squads are acting in conjunction with others, is not favorable for such supervision and control, and a provision allowing them to vary their position, when necessary to better enforce fire discipline, seems desirable. All authorities are agreed on the difficulty of enforcing fire discipline, and the prominence afforded Sergeant Schultz* on account of his having, at St. Privât, caused the men near him to reduce their sights to proper range as they advanced, would seem to indicate that the circumstances might be such that the squad leaders would render more valuable service by similar conduct than by the fire of their rifles from their positions in the line.

Paragraph 534 prescribes certain rules to be impressed upon the men in the interests of fire discipline. The only way this can be done is by rigidly enforcing such rules in drill, regularly and frequently conducted. The mere giving of the commands for firing will not impress such rules upon the men unless the most rigid compliance is exacted in the execution of the commands. To designate a particular elevation, and then allow the members of the squad to set their sights in a perfunctory way, frequently to merely make a pretense of setting them at the elevation designated, does not go far toward impressing upon them that they must "never fail to adjust the sight at the range named." To fail to designate an objective, which is approximately at the range stated, is inviting a disregard of the rule "never fire except at the named objective," as well as the one previously mentioned. A close observation of the drill of squads in extended order will show that the average squad leader offends in these particulars quite frequently, if not habitually. The importance of the "instruction on varied ground" is indicated by the requirement that "it be directed by the company officers." If these officers in-

* "Organization and Tactics," p. 111.

struct thoroughly in all the matters mentioned in pars. 548 to 558 inclusive, and the men be sufficiently intelligent to receive such instruction, the squad under instruction will certainly be in a fair state of efficiency. The means by which this instruction is to be imparted are not laid down, but left in large measure to the intelligence and skill of the instructor: hence the necessity of a thorough military education on the part of the instructor on whom so much depends.

In carrying out such instruction his skill will in large measure depend on the interest he can excite and maintain in those under instruction. To go through certain movements with respect to an imaginary enemy soon becomes monotonous; but let such enemy be represented, or even outlined, and interest is excited to such a degree that it acts as a spur to the perceptive and retentive faculties of the men. This principle is recognized in pars. 555-57, governing instruction in the use of cover, and can be profitably employed in the greater part of the instruction in extended order, and the number of blank cartridges expended in such instruction can with much profit be largely increased. Such increase would, however, necessitate considerable judgment and great care. To allow exercises involving the use of blank cartridges to degenerate into what are familiarly known as "sham battles," not only causes an unprofitable expenditure of such cartridges, but, in the majority of cases, produces harmful results. The principles of tactics desired to be illustrated are lost sight of in the common attempt to make a great noise.

Rifle firing.—Intimately connected with instruction on varied ground and, indeed, preliminary to a thorough understanding of the principles involved, is instruction under Small Arms Firing Regulations.

The value of expert individual rifle shots was well illustrated in the early history of this country, notably at New Orleans. About 5000 untrained, undisciplined, soldiers prevailed over about double their number of veterans of the Peninsula,* and the main cause of their success was that, as related of Carroll's Tennessee militia, these brave, well armed, but inexperienced soldiers were *expert in the use of the rifle.*† The arrival of these troops was it is stated, hailed by Jackson with great joy, and the work of their rifles in the defense of New Orleans showed that there was

* Lossing's "Field Book of the War of 1812," p. 1042.

† *Ibid.*, p. 1029.

reason for such rejoicing. It was expertness with the rifle, coupled with judicious use of intrenchments, that gave the defenders sufficient confidence to withstand the determined assault of Pakenham's veterans. Had this expertness been lacking, in all human probability the assault would have succeeded, and the Gulf coast would now form no portion of the United States.*

The reason for this skill with the rifle is well known. The men had secured instruction in rifle firing under conditions that at least approached those of the battle-field. The rifles they carried had been important factors in their sustenance, defense, and sports. They possessed fire discipline as individuals, and the aggregate result does not suffer by comparison with more modern instances.

While a matter of pride, the skill possessed by these men is yet a source of danger to Americans of to-day. Relying upon legends of such skill is apt to cause the belief that it is inherent in Americans and not the result of circumstances. To determine if such belief is well founded, it is necessary only to consider the character of the population from which, in the event of important war, the majority of soldiers would be derived. Increased by later additions received from the Old World, changed by the intermingling that has resulted, and conforming to the conditions surrounding them, the mass of the American population to-day has but vague ideas as to what a rifle is. Outside of the Regular Army, the National Guard, and a very small per cent. of the total population found in the mountain regions, the use of the rifle among those physically able to bear arms, is practically unknown.

It is no longer possible to give the instruction had by the early settlers, and the skill possessed by them can at best be but approximated. This has been done in the army by a system of target practice, unexcelled in the results obtained over known ranges at stationary targets. Besides the results reached in the individuals instructed, the system can be credited with having stimulated emulation in the National Guard and kept alive an interest in rifle firing. Yet it must be admitted that, as applied, there are certain deficiencies in it.

The objection that, in battle, unlike target practice, the range will be unknown, will carry far less force with the new rifle and the resulting increase in flatness of trajectory; but the lack of

* "Campaigns of the British Army," pp. 373, 377.

approximation to living, moving targets, remains with even greater force; for on account of the decrease of stopping power of the smaller bullet, increased accuracy of fire is necessary to repel charging cavalry. It will no doubt, be a difficult matter to teach accuracy of fire at rapidly moving targets, but it is believed that such accuracy can be taught to a degree that would prevent cavalry making a second charge against infantry well supplied with ammunition.

The following description by Major Macartney of the method pursued by an execrable and execrated shot to make himself the equal if not the superior of his comrades, seems so reasonable, so expeditious, and withal so interesting, that it appeals to the judgment of any one who has knowledge of either shot-gun or rifle game shooting.

Major Macartney says: "In a disused loft he had fixed up a swinging apparatus which he could work in any direction with his foot. To this he attached a tennis ball. As it swung he covered it with his gun and snapped. By degrees he found that he could cover it the moment the gun touched his shoulder. Then he substituted a lighted candle in a framework for the ball, and fired at it with small charges of powder only. When he was able to extinguish the candle, he adjourned to a field where bottles were swung on the same principle. As soon as he learned to break these regularly he tried his hand on clay pigeons. In a little over two months he was a good shot."

Excepting the clay pigeons, there seems to be nothing in this method not applicable to the rifle. Attempts to blow out the candle would cause far more interest than long continued snapping of the gun at a fixed spot, with no way of determining the approximation to accuracy that has been obtained, or even firing at the spot with gallery ammunition. Ability to blow out the candle would certainly carry with it the ability to shoot well at a stationary target with gallery ammunition, and, shot for shot, would cost less. In case the candle prove too difficult a mark for the rifle, or when it comes to taking the next step in advance, it would be an easy matter to fix a target of suitable dimensions on a board suspended by a wire and swinging between guides that would keep the target faced towards the firer. Still better would be an inclined track supported on pins thrust into holes bored into upright posts. By varying the height of the pins the inclination of the track could be changed so as to give the desired

rapidity of motion to the target. The target could be pasted on a light canvas covered frame running on two wheels and kept in a vertical position between two guides placed parallel to the track, and above it at a distance slightly less than the height of the frame. Back of this track would be a similar one by which to return the target to the starting point.

For practice with service ammunition the "A" target could be used, but running on a horizontal, earth-protected track. At each extremity of this track there would be a bullet proof shelter, and within each shelter a drum turned with a crank. A rope should lead from each drum to the lower edge of the target frame, and the winding up of one drum would unwind the other. Two men in each shelter should be able to wind up the drum, signal the shot, and paste the shot hole. In this manner the practice at moving targets could be carried out in a safe, economical, and expeditious manner. By varying the position of the firer the practice would be had with the target moving in any desired direction.

The running part, including the ropes, would be protected, and all the exposed parts could be easily replaced as soon as shot away.

This practice would not need to be extended beyond 200 yards, for practice at moving targets does not find its importance at long ranges. The objective of fire presented at such long ranges would either be of such size that they differ from stationary targets only as to elevation used, or else so difficult that only collective fire would promise any satisfactory result.

The value of the service a company so trained could render, either in repelling an infantry assault or a cavalry charge, would more than balance the expense and labor of so training all at present in the infantry arm. This is by no means intended as a contradiction of the dictum that, in the final assault, the most that can be expected of the men is that they hold their rifle sensibly parallel to the ground, but in recognition of it, and as suggesting a way by which more could be expected, and obtained. It is believed that troops so trained would not commit the error of the Austrian half-battalion at Chlum as narrated by Hohenlohe.*

The value of such training would not be confined to the battle-field. Riot duty would furnish a legitimate field for its exer-

* "Organization and Tactics," p. 111.

cise, and the decrease in liability of injury to innocent persons would warrant an increase in expense of training. It is not believed, however, that an increase is necessary. The conditions met on the field of battle will be such as to preclude firing at short range in the deliberate manner practiced at short and mid ranges. Deliberate aiming is practicable in battle only at the longer ranges, and firing at moving targets, as described, would seem to more nearly approach the expected conditions than does the present method of short range firing.

Deliberate firing at short and mid ranges is a necessity in training, but only a preliminary one. When the soldier has attained a fair degree of proficiency in such deliberate method—and such proficiency ought to result from the recruit season—it seems a waste of time and ammunition to continue such practice year after year. The necessary proficiency at fixed targets is maintained by the skirmish practice as laid down in the Small Arms Firing Regulations. Such practice is carried out under conditions that approximate to those of battle as regards time, range, and appearance of target. This approximation could, to the increase of the soldier's efficiency, be continued by the method of moving targets described.

Suppose a company so instructed, placed side by side with others, equal in discipline and drill, and having received instruction in firing for an equal length of time, but at stationary targets only. Both have the magazines filled, and are reserving their fire for use at short range against charging cavalry. Other things being equal, which company will inflict the greatest damage?

To those who would argue that excitement would neutralize the difference, an answer is given in Major Macready's description of the charge of the French Cuirassiers upon the British squares at Waterloo, or the more modern instance of the charge of Contenson's regiment upon Helmuth's company at Beaumont.* If infantry, armed with the weapon of that time, could reserve their fire for an approach to within 30 yards, infantry, properly trained with the magazine arm of the present, can certainly do likewise. Infantry that is sufficiently under control to reserve its fire for such short range is sufficiently cool to profit by its previous instruction, and such instruction would compensate for decrease in stopping power by making the riders the practical objective.

*"Organization and Tactics," p. 166.

But instruction in skirmish practice at short and mid ranges and practice at moving targets at close range by no means completes the American soldier's education in rifle firing. The causes that render the instruction of infantry of unusual importance to the United States, apply with peculiar force to long range deliberate fire. It is not a question of supplanting the action of artillery by infantry long range fire, but of best meeting the conditions that will confront the American armies during the first steps of any important war. The moral effect of cavalry and the long range effect of artillery would have to be supplied as far as possible, in these stages, by the infantry. The military policy of the United States stops far short of the expense incurred in keeping trained forces of cavalry and artillery sufficiently large to form any but a small proportion of the armies that could, in a short time, be raised and put in a fair state of efficiency. While the same military policy has operated even more stringently with respect to the infantry, it is to be remmembered that the National Guards in the different states are composed principally of infantry, that these organizations profit by example in rifle firing, as in other matters, and that raw infantry could be put in a state of fair efficiency while the new levies of the other arms were yet but a hindrance. The proportion of infantry in these hastily-raised armies that could have been trained in long-range fire would be small, but such small proportion could perform this *quasi* artillery duty, while the remainder could be used as infantry pure and simple.

As an indication that the belief in this increase in value of infantry fire by reason of the increase in practicable range, made possible by the new arm, is well founded, the action of Russia is significant. This state has extended the limits in practice of individual fire for both cavalry and infantry to 1000 yards, and the limits of collective fire to 2400 yards for cavalry and 2500 yards for infantry.

Long range, deliberate, fire would find its application in aiding the artillery duel, in compelling an early deployment of the enemy's columns, in covering the advance to the assault, in shattering supports and reserves which expose themselves in close formation, in preventing the reforming of routed bodies and adding to their confusion. Moreover, it would be used by the troops whose ammunition could be replaced with greatest ease, and thus, while increasing the storm of bullets directed upon the

enemy, would yet, by allowing the more advanced bodies to reach decisive ranges without first depleting their ammunition, decrease the liability of exhaustion of ammunition in the firing line proper.

The fact that the terrain will frequently prevent the use of this long-range fire by no means detracts from the desirability of being able to use it when the terrain does permit; and it is to be remembered that troops that can produce a useful effect with their rifles at 2500 yards will not fail to give a good account of ammunition expended at 1000 yards. So true is this principle that it is no infrequent practice among intended competitors to perfect themselves in firing at each range by practicing in the same position and target at the next longer range.

The present method teaches deliberate volley firing well, but, the increase of practicable range made possible by the new rifle, renders the use of rests advisable in practice at the long ranges. It is not intended that the rests should be other than those improvised by the soldier at the time of firing, using pieces of sod, hummocks, sticks, knapsacks, etc. By such means the accuracy of fire can be much increased, and the means of such increase might, in the majority of cases, be available on the battle-field.

It may be well to repeat that it is not claimed that infantry can supplant artillery, nor that infantry should, under ordinary circumstances, be called upon to perform the work of its "inseparable companion"; but it is believed that this use of infantry will often be necessary in American armies to aid an artillery inferior in numbers or training.

Service of Security and Information.—In order that it may the more nearly approach independence, infantry requires much practice in the service of security and information, including that portion involved in long distance patrolling.

That cavalry is the arm *par excellence* for patrolling, should never be lost sight of; but if there be a lack of trained cavalry the deficiency must be made good by infantry. That there will be such lack in any war of importance is manifest, for the war would be well under way before any large body of trained horsemen could be put in the field.

In the early part of the War of the Rebellion the difference in the value of the services rendered by cavalry to the two belligerents was marked; and that difference can, to a large degree, be accounted for in the difference in the habits and customs of the people in the two sections of country. In the one a large pro-

portion of the population had been accustomed to riding from childhood, and needed a much shorter period to become fit to take their places and perform their duties as efficient cavalrymen than did their opponents. It was only at the end of a considerable period of training that this difference of early life became sufficiently neutralized to put the opponents on the same plane.

It will appear on but little reflection that the entire country can not, to day, furnish as many mounted men who are able to remain on their horses as could the North at the beginning of the War. Except in the sparsely settled grazing regions the sight of a horseman is unusual. A few are seen in the parks and on the boulevards of the larger cities, but the riders are not those who would be apt to be found in the ranks in case of war. In all the older agricultural regions the buggy has replaced the saddle, and in the cities, towns, and suburban regions, the bicycle has superseded the riding horse.

There will certainly be a lack of cavalry in case of any important war, for such war will come suddenly, and there will not, as was the case during the Rebellion, be two opponents unprepared. The war would be ended before the expiration of a period as long as that required by the North to put its cavalry in a state of efficiency. The lack of cavalry would have to be supplied as far as possible by the infantry. A partial solution of the difficulty seems to be offered by the main cause of the decrease in the number of men accustomed to horseback riding, namely, the bicycle.

In any considerable body of infantry, raised at the outbreak of a war, there could be found a sufficient number of bicyclists, furnishing their own bicycles, to perform the duties of mounted orderlies, couriers, messengers, patrols, etc., to leave the cavalry divisions at full strength to perform their more important (and, no doubt to them, more agreeable) duties.

The use of bicyclists as messengers, orderlies, etc., has been sufficiently tried in Europe to establish their value. It is believed that in any region likely to be the theatre of an extended war, they have the field of still greater use in long distance patrolling, and as this exceeds the accepted idea, a comparison of the horse and bicycle, as fitted for this duty, may not be out of place.

As to original expense, they are on about equal terms; bicycles are kept in repair much more easily than horses are kept in condition, and at much less expense; the bicycle is noiseless,

thus possessing a manifest advantage over the horse, both as to foot beats and neighing. For its full use the bicycle requires roads, and the same are indispensable to mounted patrols. Both are liable to accidents of varying severity ; but when the horse is badly injured he becomes an encumbrance, while it is possible to use the one wheel and handle bars of a bicycle to great advantage in carrying the soldier's kit. Horses can be used in deeper mud than can the bicycle, but the latter can be used on any ordinarily well ballasted railroad with the same facility as on a paved road.

It is, moreover, easier to conceal, and more apt to be found in its place of concealment on the return of the owner. It is as easy to carry the rifle as the carbine on the bicycle, and thus have the use of its superior ballistic powers.

Taking all these ideas into consideration, it certainly seems possible for infantry to perform its own service of security and information in a fairly satisfactory manner. The necessity of its being able to do so is so apparent that every effort should be made to secure such ability. To do so will require considerable training in all that pertains to this important duty. Theoretical instruction can prepare the way, but it must be accompanied and followed by practical work putting in operation the theories learned. Such practical work must, however, include more than the practice of normally constituted outposts, advanced guards, rear guards, patrols, etc., against an imaginary enemy. As soon as the normal is learned, the art of departing from the normal, in order to meet changes in conditions and variety in terrain, must be practiced.

For the enlisted man practice in patrolling is particularly important ; for it is in the performance of such duty that he will be most frequently thrown on his own resources. Moreover, the principles taught in patrolling are applicable to the greater part of his discretionary duties in the other varieties of this service. It is in this part of the soldier's training that well instructed officers are indispensable, both to instruct and act as umpires, for it is only by opposing patrol to patrol, by having men watched as well as watching, that any real life can be imparted to the exercises.

There is one principle, most important, that will be impressed upon the soldier's mind with difficulty, and that is the importance of gaining information. Nearly all will believe their principal duty to consist in getting a shot at their opponent, no matter what the object of the patrol may be, and very rarely will an un-

instructed man allow the opportunity of getting the first shot to pass, even though by so doing he would be able to secure the information for which the patrol was sent. In order to correct this the number of blank cartridges carried should be small, and it should be impressed upon the man's mind that in the majority of cases his duty calls for secrecy as well as alertness. When he has become familiar with the methods of maintaining sufficient secrecy, it will take but a short time to instruct him with a view to objects requiring a greater degree of aggressiveness.

During all the patrol practice frequent reports should be required, for in this way, instruction can be given as to matters necessary or desirable to report, as well as to brevity and clearness of reports. Knowledge as to matters desirable to report brings ideas as to the means of gaining information of such matters.

Intrenchments.—Practice in the construction of intrenchments should be had in order that the men may become familiar with the use of intrenching tools, and may know how to utilize the intrenchment when constructed. Beyond this, knowledge of intrenching concerns officers rather than enlisted men.

Conclusion.—Though some of the foregoing recommendations may seem, at first, to relate to unimportant details, it should be remembered that nothing is trivial that has a direct bearing upon the health and efficiency of the infantry soldier. Victorious armies have always been those that possessed the best infantry; and the best of cavalry and artillery have never been able to bring victory to an army whose infantry was distinctly inferior to that of its adversary. "The infantry," says Hohenlohe, "is the army"; and General Sherman declares that "All great wars will, as heretofore, depend chiefly on the infantry." It follows, therefore, that everything is worthy of serious attention that tends to promote the health, mobility, and fighting power of the arm which constitutes the body of the army, and that nothing in military administration and instruction should be regarded as more important than the preparation of the infantry soldier.

THE NECESSITY FOR PROPER FIELD ARTILLERY PRACTICE GROUNDS, AND THEIR EQUIPMENT.

By First Lieut. F. S. STRONG, Adjt. 4th U. S. Artillery.

IT is only within the last twenty or twenty-five years that target practice has assumed a position of great importance in the military training of the soldier. The necessity for such instruction came with the introduction of the rifle and has increased as one improvement follows another. The range of the old smooth-bore gun was so short, and its inaccuracy, beyond point blank range, so great as to preclude any valuable practice at the longer ranges. What was true of the infantry arm, was doubly so for the old style field-gun. In the days of round shot and canister, it was rapidity of fire that counted. Celerity of motion upon the part of the cannoneers, was the main consideration. Fire was reserved until the last moment, that it might produce the maximum effect at short range. Cannonading went on often times it is true, at long range, but the expenditure of ammunition was out of all proportion to the damage done. Even the old 3″ rifle, with its primitive sight, was not accurate at ranges beyond 1500 or 1800 yards.

We are now confronted with a very different condition of affairs. The infantry musket has given way to the long range rapid fire magazine rifle which is effective at ranges of a mile or more. The old smooth-bore artillery field piece is replaced by the steel 3.2″ breech loader with a range of three miles and upward. This gun is very effective against troops at ranges up to 4500 yards. These improvements have increased the rapidity of fire to such an extent, as to make the supply of ammunition upon the field of battle a problem difficult to solve; they also necessitate the utmost care in its expenditure.

Both as a matter of self-preservation and of economy, we should train our men so that every shot shall produce the maximum effect. It is evident that the time required to properly instruct the soldier in the use of his fighting arm has greatly increased. This reaching out, as it were, of the range, introduces new factors, which must be considered, such as wind, light, condition of the atmosphere, etc.

We must also give a more careful consideration to the study of distance and the terrain in connection with practice firing. Such instruction cannot be given on the garrison drill ground, neither can it be given theoretically. To secure anything like satisfactory results we must train our men under actual conditions of field service.

It used to be an easy matter to conduct the firing practice of a light battery. A suitable range could be found in the vicinity of any post even in the most thickly settled portion of the country. Any hill or bluff of moderate height and extent would answer for a target butt, provided there was a clear field in front to the distance of ¾ of a mile or a mile. Now it is difficult to find a safe range for the simplest kind of practice. The result is that some batteries are unable to expend even the small allowance of ammunition that is issued to them. The want of suitable practice ground has prevented the required experimental use of shrapnel by most of the light batteries; we are largely ignorant of their effect against troops under the simplest conditions; not an organization has had practice against moving objects. We have done nothing with smokeless powder and in every way are behind other nations in the matter of instruction of artillery for field service. That it should be so, is the more to be deplored, because such training would prove the most interesting and popular duty that the soldier could have to perform. The number of discontented men would be greatly reduced if it were possible to give this instruction. Our light artillerymen are not sufficiently familiar with the piece in operation under service conditions, to overcome their nervousness.

What is required is practical, not theoretical instruction. A man may have the most comprehensive knowledge of a drill or manœuvre, theoretically, and apparently know nothing when he attempts to put this knowledge to practical use. Neither can such instruction be safely left to a time of actual war, it will be found too dangerous and expensive to pursue such a course. Again the soldier of to-day must have far greater technical knowledge than was necessary under former conditions.

Granting that it be possible to find some secluded spot where a range of one or two miles may be laid out, we will find that it falls far short of the requirements of a modern practice ground. We must determine the effect of artillery fire upon troops of all kinds under natural conditions, stationary, movable, under cover

and without, and at all ranges both known and unknown. Such practice ground must be of great extent and can only be equipped at considerable expense. It seems strange that so little attention has been given to the subject of field artillery practice firing, when at the same time the importance of small-arm target practice is so fully realized.

Every infantry post has been or is now being provided with a range, although in many cases it involves the expenditure of thousands of dollars. This is as it should be. The infantry would cut a sorry figure in actual service if it were not afforded such advantages. It is not that our foot troops receive more than they require, but the fact that nothing is done for field artillery that attracts attention to this subject. If the rôle of the artillery were less important now than formerly, this neglect might be accounted for, but is such the case? Everything goes to prove the contrary. The artillery under present conditions is put farther to the front, and is to be kept in action until the last moment, even if the guns be sacrificed. We are to silence the enemy's guns in the artillery duel, and force the deployment of his infantry at long ranges and support our own infantry even till the decisive moment of attack. We must join with the cavalry in the pursuit or block the way of the pursuers in case of retreat. All of this the artillery is capable of doing provided it be properly instructed. Something more than mere target practice is required as a part of such instruction. The artillery is called upon to perform duty of the most varied character, it must be prepared to oppose not only artillery but infantry and cavalry as well.

In the 1895 autumn manœuvres of the French, German and other European powers the tendency was all in the direction of using the artillery at long ranges up to 4000 and 4500 yards. This is possible since the adoption of smokeless powder. Nothing has done so much to increase the importance of our arm as the clearing up of the field of view due to the use of the new explosive. Are we to rest content with a knowledge of target practice at known distances against fixed targets? If so, we are a useless burden and expense to the country and might as well be legislated out of existence.

There is not a power of any military importance but that is alive to the necessity for real field practice for the artillery as well as for the cavalry and infantry. We have as powerful an arm in

the 3.2″ gun as the corresponding piece of any other country and our projectile is supposed to meet every requirement, why not make some use of both? Three of our ten light batteries have had no practice at all during the last year, two others have managed to expend their 25 rounds per gun at known distances with short range and old fashioned targets. Two others have had practice of somewhat more value, by means of constructing rough board targets, representing infantry and artillery to be fired at at known distances. The three batteries at Fort Riley have by dint of their own labor managed to secure effective use of the limited allowance of ammunition issued to them. However, their practice was with fixed targets entirely. The allowance of ammunition being only 25 rounds per gun, the fire was distributed as follows: to each battery of 4 guns:

1st. 12 shrapnel, range 2000 yds. Canvas target 10 x 20 ft.

2d. 10 shrapnel, range 2500 yds. invisible target; consisting of groups of 50 silhouette figures standing, representing an infantry squad in the act of rushing to cover. Time limit for firing 5 minutes.

3d. 10 shrapnel, range 1750 yds. target; 50 silhoutte figures standing with 2 pace intervals, representing skirmish line of infantry. Time limit 5 minutes.

4th. 10 shrapnel, unknown distance not less than 2500 yds. target; dummy platoon in battery. Time limit of 5 minutes.

5th. 10 shrapnel, unknown distance not less than 2000 yds. target; infantry column of fours, consisting of 10 sets of fours, represented by silhouette figures. Time limit 5 minutes.

6th. 10 shrapnel, unknown distance not less than 2500 yds. target; dummy battery, representing 4 guns in column of sections without caissons, in act of unlimbering to fire to right. Time limit 5 minutes.

7th. 12 shrapnel, unknown distance not less than 2500 yds. target; dummy battery in gun pits, 4 guns with interval of 20 yards between guns, silhouettes representing cannoneers in act of serving pieces, captain and trumpeter and chiefs of platoons and sections dismounted, caissons and limbers supposed to be under natural cover. Time limit 6 minutes.

8th. Short range firing. 4 shrapnel at 200—4 at 150 and 3 at 100 yds. target; 25 troopers, represented as charging the battery—rapid fire. Making in all 85 shrapnel for four guns.

9th. 6 shell, unknown distance—target; 50 silhouette figures, representing skirmishers in a ravine, standing and kneeling.

10th. 9 shell, unknown distance—long range—target; canvas 10 x 20 ft. In all 15 shell. Grand total, 100 rounds. The silhouette figures were made of rough boards as were the guns and carriages.

Of course the expenditure of 2 or 3 rounds per gun at each range is not sufficient to determine reliable data or to perfect the gunners in their duty of laying the guns, or the officers in estimating distances. As far back as 1884 the regular German allowance was 80 rounds per gun, and this was increased largely for experimental purposes.

The following is the German allowance at present: For field batteries of four guns, new model, in time of peace, annually: shell, new pattern, 90; pattern 1882, 86; pattern 1888, 100. Total shell, 276; shrapnel, 176; canister, 12. Grand total, 464 or 116 rounds per gun.

For old model field-guns: Shell, new pattern, 176; pattern 1888, 100; total shell, 276. Shrapnel, pattern 1882, 176; canister, 12. Grand total, 464 equals 116 per gun.

The French allowance equals that of the German.

Russia has a regular allowance of 70 rounds per gun, and in addition a liberal allowance for special practice and preliminary firing.

The English allowance as laid down in the regulations of 1893 is as follows: For all field batteries practicing on the service ground at Okehampton, six guns, annually: Shell, 208; shrapnel, 345; case, 15; total, 568 or 94 rounds per gun. For batteries practicing at Glasgow: Shell, 164; shrapnel, 168; case, 8; total, 340 or 56 rounds per gun. For batteries practicing at Glenbeigh, Ireland: Shell, 149; shrapnel, 139; case, 12; total, 300=50 per gun. For local batteries with only limited ranges, 30 shell, 78 shrapnel, and 12 case, in all 120 rounds. For foreign and colonial batteries, 104 shell, 90 shrapnel, and 6 case, total, 200. In addition there is allowed 3 rounds of common shell for each recruit to be used in elementary battery or brigade practice.

When we consider the great number of batteries to be provided for in these countries and the expense involved, we have conclusive proof of the value attached to such practice and the necessity therefor. We have adopted in this country the plan of maintaining a small force of the three arms as a nucleus, about

which may be organized in case of necessity a much larger army. Under this system the force that we do have, should be kept at the highest point of efficiency, in other words should be perfectly equipped and thoroughly instructed. Each of our field batteries should have at least two months field practice per year and an allowance of not less than 100 rounds per gun. This increase of ammunition would involve an annual increase of expense of about $12,000, but in connection with proper practice grounds, upon which to expend such ammunition, it would determine between efficiency and inefficiency.

Russia and Austria have each increased their force of light artillery within the last year by more than our 40 guns, in fact Russia has added to her strength in this arm 176 guns. The question of expense does not enter there.

Whether it be a wise policy for us to maintain so small a body may be debatable, but no one can question the importance of more thorough and practical instruction for what we have.

Let us, for a moment, glance at the condition of affairs abroad. We will then realize our own helpless condition and be impressed with the importance of doing something to place us in line with other powers.

Germany has the following practice grounds: There are special ranges for the foot and field artillery schools of practice at Jüterbog. One for the use of the Artillery Experimental Committee, at Cummersdorf. For the use of foot artillery alone, at Thorn and Wahn. One regiment of foot artillery has a practice ground at Guippe. For field artillery alone there are grounds at Hammerstein, near Dantzig, at Lockstedt, and Landsdorf. The artillery also has the use of the manœuvre grounds of the 1st Army Corps at Arys, the 7th at Wesel, the 10th at Munster, the 11th at Darmstadt, the 15th at Hagenau. The Saxon Corps have two practice grounds, at Zeithain and Koenigsbruck. The Bavarian army have two, at Lechfeld and Hammelburg. Thus giving fifteen such areas the smallest of which is over three miles square. Ten of these are completed. The ground at Jüterbog is an hour's ride from Berlin, is 8 miles by 3 in extent and as far back as 1883 was well equipped.

The German war budget for 1895-96 calls for an expenditure of $1,400,000 for field and foot artillery practice grounds. $300,000 of this is asked for to carry on the work at Lockstedt and $400,000 for the foot artillery grounds at Thorn and Wahn. The

establishment of these grounds has involved the purchase of valuable land and in one case an entire village was secured and the inhabitants removed. As noted above, several of these areas are of sufficient extent to be used as manœuvre grounds for an army corps.

The French have special practice grounds for field artillery at Fontainebleau and Châlons; both are perfectly equipped. That at Châlons is large enough to allow of the practice of several brigades in mass manœuvres and such practice is held annually; artillery brigades being concentrated here from surrounding districts. Other well organized grounds for the various military districts are situated as follows: near Calais; at Blanton; at Satorey; at Cervettes; near Orleans; at D'Anvours; at Besançon; near Portiers; at Mencon; at Braconne; at Fontaine du Bergers; at Chambrun; at Nimes; at Cousse; at Tarbes. Also a special practice ground in Algeria for the artillery serving in that country.

Russia is provided with eight artillery practice grounds and even Italy has six.

Austria has several and other of the lesser military powers have one or more.

England has a very completely organized practice ground for artillery at Okehampton and another at Glenbeigh, Ireland; also one at Glasgow and several smaller grounds for the use of local batteries.

The English War Office is fully alive to the necessity for more thorough field practice, under service conditions. Major Smythe, R. A., in a recent article on this subject says: "Every artillery officer should look forward to the time when his corps can prove that they are masters of their weapons, and this will be when practice reports of all batteries report good results throughout." Again, he continues: "Every one will agree with the statement that a country paying troops has a right to expect that all arms will take the field when needed and produce the best possible results under all circumstances. All training in peace should tend to realize this expectation.

"The general object of all arms in war is one,—the defeat of the enemy. But in bringing this about, each arm has its separate rôle, that of the artillery is rapid accuracy of fire under service conditions."

Major Smythe thus writes in the tone of a critic and yet the English light artillery receives instruction far superior to any-

thing we have attempted. Thus it appears that while other nations are spending time and money in order to make the artillery arm effective we are marking time. More than six years have passed since the new guns were issued, yet few officers are familiar with them and not a single organization has had an opportunity for proper service practice. At the School of Instruction at Fort Riley the practice does not equal that given at Jüterbog as far back as 1883.

The value of practical instruction under service conditions was illustrated on a small scale during the successful French campaign in Madagascar in 1895. The field and mountain batteries showed remarkable accuracy and rapidity of fire. On one occasion a field battery by its accurate practice enforced the surrender of an important position at a range of 4260 yards. These troops were not veterans, they had simply been given thorough training under suitable conditions in time of peace.

The intention abroad seems to be to provide a separate practice ground for each army corps or district. In England, short as the distances are, two special grounds have been thought necessary. In this country, if our force of light artillery be increased by four batteries, as would be the case, if the proposed legislation is secured, we should require three practice grounds, one at Fort Riley, one in the east and one on the Pacific coast.

That at Riley should be a model, complete in every way, suitable for a school of instruction. The others need not be as large or expensively equipped.

Could the original plan be carried out, of sending one battery from each regiment to Fort Riley, untold good would result from the practice there alone. We have there a beautiful reservation of 20,000 acres in the heart of a rich farming section where the cost of subsistence is at a minimum. The ground is particularly adapted to the purpose, being varied in character, and of sufficient extent for the manœuvre of an army corps.

Let us now consider the equipment of the practice ground itself.

In the first place it is very desirable that it be completely organized, that is, in such a manner as to admit of the illustration of tactical problems under nearly service conditions. All authorities agree upon this point.

An able French writer says: "One can readily understand that in the case of an incompletely organized ground a great part

of the interest is lost, especially for the commandant of artillery. The exercise becomes simply the development of an operation known from the first. The commandant and commanders of groups have no orders to give, that could not have been foreseen from the beginning." On the other hand if the ground be completely organized he says: "In this case the fire and movement of the troops may be made to follow closely those of actual war. This has the advantage of giving both officers and men excellent preparation, especially the commandant and commanders of groups. It becomes an excellent school for the construction of orders, and the management of fire. It aids and develops the initiative spirit of these officers; and finally placing the personnel of the batteries under conditions approaching those on the field of battle, prepares them for actual war, both as regards orders given them and the objectives of fire."

The German regulations of 1894 say: "Instruction in time of peace should, whenever the ground will permit, be given according to actual conditions of war, with the three arms combined. To give such instruction the ground must be completely organized."

The English regulations of 1893 prescribe preliminary practice from 1000 to 4000 yards against both fixed and movable targets. For service practice it is prescribed that the ground be completely organized so as to represent all phases of the attack and defense and to enable the solution of a tactical idea for each day's practice.

When the field is thus organized we can manœuvre the objectives as though they were troops on the field of battle. As a result all orders from the commandant down to the battery commanders and from them to the officers and men will be formulated as they would be in actual war. For such a practice ground we require:

1st. Objectives. These, to be of value, must by their appearance, their position and quickness of action resemble real targets or objects.

2d. A suitable number of covers or shelters, for the protection of the men charged with the management of the targets.

3d. Telephonic communication must be established between the director of the park and the shelters.

4th. They must provide means by which to quickly show the

movements of the various objectives as ordered by the commandant who is director of the exercises.

The necessary objectives include the following: Walls: epaulments of earth; villages; lines of infantry and cavalry at rest and batteries of artillery horsed. Lines of infantry behind entrenchments, lines of skirmishers kneeling and lying down. Batteries of artillery in position behind natural cover and in gun-pits. Columns of infantry, cavalry and artillery at rest. Columns and lines of infantry, cavalry and artillery which may be made to appear and disappear at will. Columns and lines of infantry, cavalry and artillery advancing directly and obliquely; same crossing the range; same retiring directly and obliquely.

Walls and epaulments are necessary to show the effect of fire against obstacles and the effect upon troops partially protected by same.

Villages are required in order to determine the effect of concentrated fire, as well as their value as a cover for troops.

The other objectives spoken of, enable us to determine the effect of artillery fire upon troops of all arms under various and varying conditions. A ground completely organized must be of sufficient extent to allow of ranges up to 4500 yards. One part of the area should be set apart for the objectives, the other for the batteries undergoing instruction or taking part in the practice.

If the ground be of sufficient extent to accommodate two or more sets of objectives in the different positions, much may be added to the interest and value of the instruction; a greater number of problems may be presented. Still with a single set of objectives it will be possible to illustrate most situations that would develop on the field of battle.

As regards the construction of the targets perhaps the most practicable and complete system is that embodied in the German regulations of 1894. Here will be found in detail every direction necessary for the construction of targets by the troops themselves; also the means by which they are to be operated. Similar instructions have been issued by the French, Russian, English and Austrian war officers.

Villages are built of light boards and are so placed behind the natural cover of the ground as to represent simply the roofs and upper portions of the buildings; the whole is painted in such a way

as to present at a distance a perfect illusion. Detached buildings such as farm houses, barns, etc., are similarly constructed. Walls, fences, etc., are made of boards driven in the ground and painted to represent stone work if necessary.

The targets proper are of three kinds: 1st, fixed; 2d, appearing and disappearing; 3d, movable. Fixed targets are silhouettes cut from boards and painted on the side toward the enemy. The other two classes are sometimes made of wood but more frequently of cloth or card-board placed over a wire frame. This gives the true form of the body and when painted is very real. The paint serves to protect them from the weather.

Fixed infantry silhouettes are made to represent men standing, kneeling, lying down, also covered waist high, breast high and as high as the head. These last to represent men behind walls or breast works.

Cavalry silhouettes are not often required as fixed targets; they show the trooper mounted.

Artillery silhouettes are the same as for infantry and in addition others to show men mounted and horses without riders, also the piece limbered and unlimbered, with and without, caissons. Whenever possible old material should be used for carriages, limbers and caissons.

Various combinations of silhouettes are used to represent objectives: For example, a line of skirmishers on open ground by means of silhouettes of infantry lying down. A battery of artillery unlimbered with silhouettes of cannoneers standing or kneeling.

Objectives formed by using appearing and disappearing targets representing infantry in line or as skirmishers can be obtained by attaching simple silhouettes to an arbor which is operated from a shelter. If a column is to be represented the silhouettes in each rank are attached to a light frame and this in turn to the arbor. An arbor 150 feet long carrying 70 silhouettes is easily moved by one man.

An artillery objective appearing and disappearing showing a battery in action with limbers and caissons fully manned and horsed can be operated by two men. The silhouettes in this case are made of card-board.

Movable targets are obtained by attaching silhouettes to light frames and these in turn to a carriage or runners. Three kinds of frames are required: No. 1, for infantry carrying 25 sil-

houettes. No. 2, carrying 15 cavalry silhouettes. No. 3, for artillery carrying one piece fully manned.

The Germans use long sleds, the runners being curved up at both ends and placed far apart so as to move equally well in either direction and not upset on rough and uneven ground. They are propelled by means of long wire cables drawn by horses. The French, English and Austrians use wheels instead of runners, the Austrians making use of old condemned limbers. All use horses as a motive power.

The German infantry targets are so arranged as to appear erect while in motion, but may be made to assume the kneeling or lying down position upon halting. The artillery target likewise appears horsed while on the march but may be thrown "in battery" upon halting.

This is accomplished by means of wires attached to an arm projecting from the arbor which carries the silhouette frames, these wires run to the shelter; by drawing on one the arbor is revolved through $\frac{1}{4}$ of its circumference and the targets appear lying down, the other wire enables the operator to reverse the motion and throw the target into view. By means of this simple device, rushes of infantry and changes of position of artillery may be readily shown. For the protection of the men operating the targets, bomb proof covers are provided. The most satisfactory are those used by the French; they are made of steel and are of sufficient size to accommodate 8 men. They are portable and are provided with observation windows and openings for the necessary cables, arbors, etc. They may be covered with earth on the side toward the firing point. There are fifteen such shelters on the polygon at Fontainebleau, and they have given great satisfaction.

A complete telephone system must be established, connecting the bomb proofs with each other and with the station of the commandant, also with the director of the practice batteries and the judges if there are such. These lines are run along the sides of the polygon on poles or if necessary under ground.

Some of the German and French grounds are also equipped so as to simulate the fire of the objective batteries.

Since the adoption of smokeless powder there is no perceptible smoke from the infantry fire, but it adds to the reality to be able to indicate the fire of artillery, which still produces more or less smoke. Paper shells are placed at proper intervals on the

ground in front of the muzzles of the pieces and are connected by a train of quick burning powder which may be ignited from the bomb proof. It seems strange that electricity has not been used to fire them.

The Germans and French also make use of captive balloons which are used for observation purposes.

There are many such artillery practice grounds abroad fully equipped with the material spoken of. Were it not for the number considered necessary, one for each army corps, and the expense involved, doubtless many appliances would be included in the equipment which would add greatly to the ease of management. Such improvements readily suggest themselves: The laying of sunken tracks after the manner of cable and electric street railways, in various directions over the hostile field, upon which light steel cars could be run, these cars carrying the targets and propelled by steam or electricity; is entirely practicable.

There is now in use in Vienna a single rail underground electric road which would seem to be specially suitable for this purpose; the trench is narrow, the necessary protection for the running gear easily secured and the expense moderate. The employment of steam or electricity, either, is a simple mechanical problem easy of solution.

The details of construction of the railways and targets cannot be given within the limits of this paper, and in any event should be determined by a board of officers especially detailed for that purpose. Given the necessary funds and we can soon prepare the most perfectly equipped practice ground ever constructed.

As has already been stated, there is to be found in the heart of the military reservation of Fort Riley a magnificent amphitheatre having sufficient length to give all ranges from point blank to the extreme limit of even the 3.6″ gun and a lateral extent of 2200 yards, and at no point would the targets be less than two miles from the reservation line. The character of the soil is such and the features of the ground so favorable for the purpose as to render its equipment possible at a minimum cost. A rough estimate would make the expense about $40,000 for the complete equipment of this particular range.

It is the firm belief of the writer that in no other way could such a sum be invested by the Government with as sure a guarantee of its being money well placed and for the best interests of the whole country.

CAVALRY FIRE DISCIPLINE.

By Brevet Major E. S. GODFREY, 7th U. S. Cavalry.

"FIRE is everything, the rest is nothing."

The discussion of this subject has reference more particularly to fighting on foot, dismounted firing The limitations of mounted fire action are almost self-evident.

Heretofore dismounted fire action of cavalry may be said to have had "no standing in court," *i. e.*, in European countries, but I believe that it will be only second in importance in all cavalries of the future, as it has been in the American cavalry in the past. It follows then, that whatever formations and methods are best for infantry attack and defense will be best for cavalry fighting on foot. I further believe that assimilation has come to be a permanent principle of our system of tactics, just as I do that the single rank formation has come to stay; and that the adoption of these principles will be only a question of time.

Prejudice and conservatism must surely wear away. In assimilating, I do not mean that there shall be such a slavish adherence as to diminish the efficiency of any arm. Whatever is characteristic, is necessary to the efficiency of any arm, and that characteristic should be retained, regardless of assimilation; but in all other features, let there be as much uniformity as the peculiarities of each arm will permit.

Our armies will be made up of the people, by volunteers, and as nearly as numbers will allow, they will be permitted to choose their arm of service, in regulars or volunteers. During the War of Secession there were instances of whole regiments being transferred from one branch to another. After the bounty system had been adopted, it was found almost impossible to keep the organizations of the Regular establishment up to an efficiency limit, and from 1862 it became necessary to transfer and attach men of volunteer organizations to the regular batteries in order to give them a proper complement.

Men who have served in one branch will reënlist in another: What is true now will be true in the future, both in peace and war. By means of assimilation service in one branch nearly fits the soldier for service in another; he has less to forget and less to

learn. The American people are a general utility people and assimilation is in the line of general utility.

"Fire discipline is the unhesitating habit, developed by instruction and training, of commencing, relaxing or ceasing the fire, and concentrating it on the designated objective in obedience to orders. No firing should ever be permitted without orders; and it should cease as soon as the command Cease Firing is given."

The Drill Regulations state the rules concisely; Wagner gives the reasons therefor with clearness, and Bachelor elaborates all the details. The control of fire in battle, or fire discipline is intimately connected with the control of men under fire, and it is to this phase that I will give most attention.

It is difficult, if not impossible, for any one who has not commanded men under fire to appreciate the difficulties and dangers incident thereto (I mean from the moral point of view). It is a mistake to suppose that because a man has been in the service for years he may be depended upon absolutely to do one's bidding when he goes into action for the first time. It will then be found that drill is important, discipline more important, and personal equation is most important. The combination of these makes up the morale, the soul.

Some men seem to be fearless and do whatever is told them, and do it intelligently; some are sullen and whatever they do, they act as if under protest; another class are stimulated to the utmost activity and want to be doing something, and if they are held down they will talk; it seems that they must have a vent; they are easily excited and are difficult to handle in a retreat. Another class appear to be overcome, lose all self-possession, are wild-eyed and when an order is given look at you in an appealing sort of way. They want some place to hide, they have to be watched and driven, but such men often recover themselves and do excellent shooting.

I doubt if there are many men who at some time while under fire would not agree with the volunteer colonel, of whom it is related that during a battle when he saw a rabbit scudding to the rear, exclaimed: "Go it cotton tail! if it wasn't for reputation I'd run too!"

Experience has shown that in hastily raised volunteers, officers, non-commissioned officers and privates are about alike in their ignorance and knowledge of drill and military subjects in

general. They are nearly all on the ground floor; nature and culture have qualified some to better fill certain positions than others; but in the beginning, men will be elected and appointed to positions through influences not necessary to discuss. In the beginning each man will strive to learn the duties of his particular position; he will next strive to learn the duties of those above and below him; they may and probably will go hand in hand, but his own duties will be paramount.

Experience has also shown it almost an axiom, that to control raw inexperienced men, authority must be subdivided to a greater extent than with disciplined, well-seasoned soldiers. The greener the troops the greater the necessity for personal supervision or control by their leaders; the fewer the men in that subdivision (within certain limits of course), the better that control; in other words, the men must be immediately under the eye and voice of some leader. The squad gives the most convenient subdivision for this personal supervision and therefore becomes the unit of fire discipline.

In the early stages of the fight, especially at the extreme ranges, volleys should be used; if the range is known, with a single sight; if the range is unknown or estimated, the fire may be with "combined sights"; that is, one portion will use a certain elevation and another a different one, and so on, the elevations differing by 100 or by 50 yards; each unit using the same elevation. In volley firing, if the troop or company has not been deployed, the captain gives the commands; in other cases, the leader of the unit of deployment. When the captain designates the range, each subchief should require the men of his unit to place their sights at the designated range, and see to it that it is done. As the troop deploys into line of squads or skirmishers, this personal supervision will necessarily devolve upon the squad leaders, especially while the firing line is within the limits of "the rain of fire" and before the time for the rapid fire. Undoubtedly this will be a difficult thing to do, but the chiefs of platoons are in rear and near the line to caution and require the squad leaders to enforce it. The chiefs of platoons must be a little in rear so as to be able to hear the commands of the captain. Captains must be some distance back so that the major, if necessary, can communicate with them. This disposition of the leaders will be more necessary now that we have the magazine gun and smokeless powder than when the firing line was more or less hidden by

the friendly veil of smoke. Some such disposition would seem to be necessary in order that the major may keep in touch or communication with his firing line.

The ammunition supply, after the battle has opened, continues in the domain of theory. It has been advocated that the firing line be re-supplied by its supports, who will carry the additional supply in extra belts. But I know that the men always growl when they have to give up any of their ammunition, even when not in the midst of a hot fight. Men become terribly selfish while under such a strain. And again, some tacticians are advocating the doing away with troop or company supports and having only the squadron or battalion reserve. Whatever the formation, the safest rule will be to have the firing line supplied with all they can well carry when they go into action. It is difficult to get the men to take ammunition off their killed or wounded comrades, they say it seems uncanny. After getting within the limits of "the rain of fire," say 700 yards, it will be extremely difficult to move the firing line, except in advance or retreat; any openings in the firing line will probably have to be filled, especially on the flanks, from the reserve, which is the manœuvring part of the fighting line. During this period the chiefs of platoons will probably have to be on the firing line, so as to lead their platoons and to give personal attention to controlling their fire, the firing being with counted cartridges only. This firing with counted cartridges is all important; the lull in that immediate vicinity affords a breathing spell to the men, allows the chiefs of platoons to look to the captain for orders, and gives opportunity to say a few words of caution and encouragement to the men. During this period it will be important to see that the magazine is kept filled and locked, and not used except when ordered by the captain. During the latter part of the War of Secession many of our cavalry regiments were armed with the Spencer magazine carbine, but it does not appear that there was any restriction on the use of the magazine, that being left entirely to the man, and the tendency was to use the magazine on all occasions. In firing at will only those men who can see the enemy should fire. In theory they should aim deliberately, fire, load, and continue the firing until the command cease firing. In this there will be two difficulties, namely, to get the men to aim deliberately and to cease firing. And this you may depend upon, if there is an enemy in front returning a hot

fire, the men will fire directly at them; you can not get an oblique fire from your own men, nor are you likely to get them to fire at an objective beyond the opposing firing line. The tendency will be to fire at the nearest enemy in their front. The rapid fire should be used only when some particularly vulnerable objective is exposed, and also just at the decisive moment. The magazine should then be used without further indication. Even in the charge, there will be some men who will fire; it is a waste of ammunition and should not be permitted; this tendency may be partially checked by cautioning the men just as the start is made.

At the battle of the Washita, I was ordered, after charging through the village, to take my platoon and bring in the pony herd. While executing this I saw some dismounted Indians escaping over the hills on the opposite side of the creek. I sent the herd in by a guard and made pursuit. The Indians picked up a herd out grazing, mounted and made escape. I followed for nearly four miles, until I saw in the open valley beyond a large village. The escaped Indians began circling and the warriors started to their rescue. Retreat was necessary. The old tactics (1841) prescribed the retreat by alternate files. I had two sergeants who had had war experience; one, Sgt. Conrad, had been a captain of volunteers, he was subsequently killed by robbers while escorting a paymaster in Montana. Each was given charge of a line. We retreated from ridge to ridge; but the retreating line masked the fire of the standing line until it had passed. While the retreating line was in the depression between the ridges, the standing line did some firing. But the retreating line felt uneasy, unsafe from our own fire, and the men naturally gravitated toward a flank, so that after two or three passings the men grouped into two squads. We had no loss. On the opposite side of the creek and about two miles away were Major Elliot and about twenty men; they, too, had pursued dismounted Indians; the bulk of the warriors of the village I had seen were pitted against them. The Indians told me afterward that he retreated until he had some men wounded, and then attempted to take them off with him when his party was entirely surrounded and cut off. After his losses became considerable, the remainder of the party mounted and attempted to break through, but in the pursuit all were killed. His retreat was over open and rather smooth ground.

On the Yellowstone, in 1873, four troops were ordered to charge and to pursue to a certain ridge. Arriving at this ridge, the Indians, with one exception, disappeared over "another ridge, just beyond"; this one, whom I afterward learned was Chief Gall, had on bright scarlet leggings and blanket and rode back and forth across our front. While halted mounted, there must have been several hundred shots fired at him, apparently without disturbing him in the least; but when a number of men were dismounted, and commenced firing he beat a hasty retreat.

At the battle of the Little Big Horn, the troops under Major Reno in the first attack, probably had twenty minutes fire action; yet when they got to the top of the hill many were clamoring because they were nearly out of ammunition, and Benteen's troops had to divide. Each man was supposed to have in his belt and saddle-bags one hundred and fifty rounds. I noticed that the men gave up their ammunition rather ungraciously. The expenditure seemed incredible, but it set me to thinking. If we whipped the Indians, and pursued them to their agencies on the Missouri or in Nebraska, as General Custer had threatened to do, we might have a dozen fights; yet in the first fight men had fired nearly their whole allowance! After Reno's forward movement, my troop (K) was ordered to take position along the crest of the ridge overlooking the valley; I had a long line and only about thirty or less men to cover it; I distributed these men in squads, each under a non-commissioned officer. There were but few Indians to be seen in the valley and they were single horsemen, well scattered and far away; yet some men fired at them. After I had explained the situation and called attention to the great expenditure of cartridges by Reno's men I had no further trouble. Soon after this, I was ordered to go back to the selected position where Reno had gone with the main command. While marching back a heavy fire commenced on the troops in rear, and looking back I saw Troop "M" coming on the dead jump, and soon afterward Troop "D" appeared over the crest on the gallop; the Indians followed closely. I dismounted to fight on foot and drove the Indians back over the hill. Then I began the retreat which according to the old tactics was by odd and even numbers moving to the rear alternately. At first there was a semblance of conformity to the drill, but it was not long till all were practically in one line. At first, too, the men would halt, kneel, and fire deliberately. After a bit they would stop, fire hastily and move to

the rear; and then some men did not stop or fire at all, and of course were far from the rear-most men. In other words I saw that I was losing control; after considerable effort, with the brave assistance of Captain (then Lieutenant) Hare, I got them halted; but the tendency was to close into groups. They were made to take intervals: in the lull, the Indians started for us again; we opened fire and drove them back to cover and resumed the retreat. This time I ordered the whole line to retire. Reno sent me orders to hurry back; I gave the command, Double time, March! and to my amazement some of the men started off like sprinters.

At this new phase my heart sank and I exclaimed, "My God! they are going to run!" I had nearly used up my voice in giving commands and talking, but with the energy of desperation I flourished my revolver and made the air blue! I did some tall swearing, and threatened to kill any man who ran away and that he might as well be killed by the Indians as by me. The men looked at me aghast! I could see, it seemed to me, every eye turned toward me; it was an awful moment; but I had gained control. I called a halt and thereafter had an orderly retreat, held the enemy away and got back to the command without the loss of a man. I say orderly retreat, but when about five hundred yards from Reno's position, he sent me an order to run back as quick as possible. So when about three hundred yards from the position, and when in full view, I gave the order "Every man for himself, and hurry back!"; the distance was covered in good time. The whole distance covered in the retreat was about a mile and a half. On the second day I gave orders that only the good shots should fire without orders; the others only by permission. One man asked permission to fire at an Indian who would expose himself, fire and then dodge back to cover. I gave the permission and told him the range. He made his arrangements and when his Indian came out, aimed deliberately and pulled the trigger. There was a very perceptible dropping of the muzzle, and flinch, but no report. I said, "you forgot to cock your piece." The men laughed heartily and enjoyed it the more because this man was one of the witty ones of the troop and a great joker. After that I selected men to fire whether they were good shots or not, but none of them fired without orders. At this time, they were all grouped close enough to be under my personal supervision.

Before the battle of Wounded Knee I had a letter from a distinguished officer of the army in which he said: "I hope even yet to see the campaign settled without a fight. If there is a fight however, there can be no question as to the result. With our arms and marksmanship it will be interesting to note the difference between former battles and those now fought." When the fight came off the result was a surprise, a great surprise. All the firing that I saw was within two hundred yards, kneeling and standing, from the shoulder. As soon as the Indians crossed the ravine, perhaps two hundred yards distant, and attempted to escape on the Agency road, I gave the command, "Commence firing!" I know the men did not aim deliberately and they were greatly excited. I don't believe they saw their sights. They fired rapidly but it seemed to me only a few seconds till there was not a living thing before us; warriors, squaws, children, ponies and dogs—for they were all mixed together—went down before that unaimed fire, and I don't think anything got nearer than a hundred yards. I believe over thirty bodies were found on our front. With perhaps two exceptions, I don't believe the men had been under fire before. They had fired at target and drilled at aiming until it seemed to be a second nature to shoot where they looked!

Having a strong firing line on the defensive, of equally well trained troops, I believe no attacking body of troops, however strong or determined, could reach the line. The moral of that story is that target practice is an immense success, and as a factor in fire discipline will prove of very great value.

If I should ever have command of a volunteer regiment in time of war, I would endeavor to have small detachments come in contact with the enemy and exposed to fire before taking the regiment into a general engagement. It is the best method to make soldiers and to avert disaster. New men are easily excited and while appearances favor success, are easily led; but under adverse circumstances, they are easily stampeded. "War can only be learned by facing fire."

THE HEAVY ARTILLERY OF THE FUTURE WITH ESPECIAL REFERENCE TO ITS SERVICE.

By First Lieutenant ALBERT TODD, 1st U. S. Artillery.

THE condition of the heavy artillery has improved very materially within the past few years. The time was, within the recollection of most of us, when there was scarcely a pretense of doing any real artillery work. A little desultory drill, and at a few posts possibly, semi-occasional utterly unsystematic target practice about made up our service in artillery. The bulk of what we did, not very much all told, was in infantry. Then came the small-arm target craze in which the artillery plunged as deep as the infantry and cavalry, and our proper function was still neglected.

But at last there came a change. Artillery drills increased; target practice was begun with some idea of system; range finding and harbor plotting were taken up; until now, while far behind the stage of artillery advancement we should have reached, yet we are artillerymen in more than the red in our uniforms.

Now, what shall the future of our arm be? Its importance in any foreign war is beyond question, and of all arms of the service it needs the most thorough preparation in time of peace. Its future depends on two factors, Congress and ourselves. The national legislature can give us the forts, the guns, the men; the rest we must do. While it seems hardly probable that Congress will give us all that *we* may deem necessary, yet that something will be done in the next few years is almost certain, and we must be ready to do the best we can with the means that come to us. Even if much has to be done with obsolete or imperfect material, we are not therefore relieved from the work.

The object of this paper is to indicate what we may accomplish with the forts, guns and men that we shall probably have, to put ourselves in a proper state of efficiency. We will take a somewhat hopeful view of what the law-making powers will do for us, and suppose that forts and guns up to one-fourth of the proper number will be provided, and that the personnel will be increased by, let us say, 50 per cent., with such readjustment of

rank—including a chief of artillery—as will insure promotion at a reasonable age to the officers, and such increase of pay for non-commissioned officers and the higher grade of privates as shall attract and retain competent gunners. This done, the remainder of the problem is to be solved by ourselves. Whatever wisdom there is in artillery matters must of course be mainly found among artillery officers.

First of all, we must rid ourselves of the infantry idea. To a certain extent we have done this, for, as I have said above, the proportion of artillery work is much greater than it was, say ten years ago. But there is still too much infantry and will be until there is none at all. The subject of artillery is none too small to engross our whole time and energies, if we are to go to the bottom of things and not merely skim along the top in an amateurish sort of way. I know there are arguments in favor of retaining a part of our infantry work; that our army is so small that the artillery must sometimes be used as infantry; that to keep our men soldierly we must have parades, etc.; that the men need rifles for guard duty; and that a time may come, even when serving the heavy guns, when the men must take up their rifles for an infantry defense of the work or in self-defense. As regards the small army argument, possibly as a matter of somewhat short-sighted expediency, there is something in it, but it appears to the writer that this Government should support infantry enough to do its infantry work, and not require one arm to try to do the duties of two, with the chances of doing neither duty very well. Economy is all very well, but it can be carried to unwise extremes. It is of course desirable that our men should be kept in a soldierly condition—the only point is, what is a soldierly condition for heavy artillerymen? A proper course of setting-up and gymnastic exercises, and such marching drills as will insure a respectable appearance in proceeding from one point to another, are believed to be sufficient in addition to the regular artillery exercises, to make good artillery soldiers.

Guard duty in the artillery is and will ever be that of watchmen and guarding prisoners, which can be performed by men armed with revolvers. The argument that men would need rifles for the infantry defense of a work, has weight if no infantry soldiers are to be assigned to such duty. But in a proper scheme of defense, there should be such an assignment and the artillery should stick to their own guns. Of course it is understood that

such rapid fire and machine guns as form part of the defense be manned by artillerymen. It is not insisted that this divorce of the artillery from infantry work is absolutely necessary for carrying on adequate artillery exercises, but it is certainly very desirable.

Let us now consider the work necessary to put our heavy batteries in an efficient state. Of course the writer is not so presumptuous as to say that nothing of value has been done in the past, for there has been much of very great value, but by still further and more thoroughly prosecuting the work already begun, and by taking up new exercises, we may attain a much greater efficiency. The drills and exercises common to all arms, that is, setting-up and gymnastics, need not be more than adverted to. Their value is unquestioned, and the artillery soldier should not be stinted in them. The special drills for artillery—I refer to the manual of the piece—should of course receive careful attention, but these drills should be carried on in a spirit of moderation. Nothing can be more wearisome and profitless than a drill gone through with for the mere purpose of putting in the hour. The learning of the movements for the manipulation of our guns is not difficult, nor does it require the expenditure of very much time. Old soldiers, on the advent of the drill season, need but very few drills to refresh their memories, and after that is done, further hours spent in mere pulling and hauling are but "vexation of spirit." For recruits, of course, the drills should be carried on until the men are conversant with all the manœuvres, but so much of these drills as may be needed in addition to the necessary drills for the older men should be the same as other recruit exercises, in separate drills, with only such well-instructed men present as are necessary for carrying on the drill to advantage. The drills thus far referred to are the mere movements for the proper working of the individual guns, and when the men are proficient in these, the combination of the guns in harbor defense is the work before us.

Up to this point the instruction may be mainly given by non-commissioned officers, officers if present at all being so only in a supervisory capacity. It is only by putting greater responsibility on our non-commissioned officers that we can hope to obtain good ones. If an officer does the work of a sergeant, the latter will never become a good sergeant.

Before passing to the subject of harbor defense, it will be well

to refer briefly to the subject of indoor instruction of the enlisted men. Of this there should be as little as possible. The climate at many of the posts precludes outdoor exercises during a part of the year, but the work should be in the open air whenever practicable. Men will learn more in one hour actually doing a thing than in three hours studying about it. But of course there must be some indoor instruction; that laid down to be gone through with in preparing men for the examination for gunners, while admirable in many respects, is susceptible of some improvement, or rather, the method of using that course may be improved. We try to teach our men too much. This is due in many instances to the requirements of the examining boards. For instance, *how to use* angle measuring instruments is sufficient for the enlisted man, and men of average intelligence can learn this comparatively soon. Questions as to the construction of the instrument, theory of verniers, etc., tend but to befog the soldier's brain. Then take the use of range tables. Why should there be weary weeks spent in learning how to interpolate by aid of pencil and paper? Why not have the range tables in such shape that any desired elevation, correction for deviation, or other data can be taken out at once or practically so by the use of some mechanical device? Some of these devices have already been found and other and better ones would doubtless be brought forward, if their use were authorized. The method of using range tables taught the enlisted man should be exactly the same as that to be used in actual practice so far as the enlisted man would use the table at all. Then there is cordage. The present system of instruction was made out, if I mistake not, by an officer who had been a sailor, and while doubtless the knowledge acquired by the enlisted man in mastering it does him no harm, yet there is in it a great deal more curious than useful, for artillerymen. Again as to laying guns. So far as possible the work indoors should be the counterpart of that at the battery. At almost every post there are or may be made by the post mechanics such models of guns and carriages that the whole subject of laying guns can be readily and accurately illustrated. Such appliances have been made in many cases, and have proved of the greatest benefit. They should be in use everywhere and the necessary material for their construction should be provided.

Let us suppose our men well drilled and instructed, and the officers familiar with the theory of harbor defense. These are but

the preparatory steps. We have yet to apply the knowledge and skill gained to the actual service of the guns in defense. Here we approach the subject of range finders, harbor plotting, fire control; all things which are receiving due attention by boards and other experts but which the service batteries have as yet but little more than played with. A comparatively few hours each season are devoted to range finding and vessel tracking and during the brief target practice the azimuth circles, plotting board, anemometer, etc., are used, but there is in the course of the year but little of the kind of use of these accessories that there would be in actual service. Moreover but comparatively few even of the intelligent men of the batteries are competent to read and transmit angles in a service way or to plot promptly and accurately. As a matter of fact the range finders, plotting boards and other instruments should be in almost constant use during the time the weather will permit. Only by long continued practice can real efficiency be attained.

There are a number of instruments and devices so far not carried beyond the domain of experiment which will soon doubtless be adopted for service, and they should immediately upon introduction be put to regular use, not kept for show occasions on the plea that they are liable to get out of order by rough handling. Of course they should receive due care in manipulation, some of them possibly only used by officers, but if they are so delicate that ordinary service usage is liable to disable them, the sooner we know it the better.

The position in a work that range finding and other instruments are to occupy, needs careful attention. So far in the establishment of base lines and instrument houses, this matter has apparently not received much thought, for the instruments are now placed in very exposed positions where they would be swept away in ten minutes by the enemy's fire.

It would be vastly better to have them established *now* where they would be in time of war, than to wait till the war comes; for then we would be unfamiliar with the new positions, and much confusion would result.

But we will assume our range finders and other instruments in their proper places, our officers and a reasonable number of enlisted men familiar with their manipulation, now comes their application to gun service. And this is the crucial test. No matter how good our instruments are, how accurate our cannon, how

well drilled our men in the service of the individual guns, the use of the instruments and the drill at the gun must be connected by many and careful harbor defense drills. To this all preliminary training and instruction must lead up. Let an attempt now be made to outline in a general way how this higher work should be done.

The batteries at a fort are assigned either permanently or provisionally to groups of guns; one, let us say, to a mortar pit, another to one or more guns on lifts, another to guns on disappearing carriages, another to auxiliary guns. The range finding stations are properly manned, and the fort commander, with his staff and messengers are at the observation turret. At first much time and thought must necessarily be spent in merely getting the machine in working order, so that messages, whether telephone, telautograph, or telegraph are accurately and quickly transmitted; that the guns are loaded and laid in the necessarily short time that would be available, and that they are fired at the signal, when centrally controlled fire is used; that the magazine service is prompt and the ammunition parties do not interfere with each other; that the reserves to take the place of men disabled or retiring to rest are at hand; and the many other details which are sure to need attention are foreseen and provided for as far as possible. These various things would not of course all be learned at once, but one after another and then combined.

The machine in running order, the fort commander would set it going. As one exercise he would assume a certain attacking force and make his dispositions for repelling it. He would bring certain guns into action at one range, others when the enemy's vessels come nearer. Speed, direction and size of the supposed vessels, force of the wind, and other conditions would be taken into account and the necessary data sent to the guns to enable the immediate commanders to give the correct elevations and deviations. Then at the proper time the signal for firing would be given, or in some cases this would be left to the officer at the gun. The position of the target at the instant of firing being laid down, the point where the supposed shot falls may be plotted from the elevation and deviation given, and the error if any measured. When available a tug might steam up and down the channel to simulate an enemy's vessel, and the supposed fire take place at her. At intervals she might stop as if to deliver fire at the work and at these times the fort's fire would be increased.

Similar exercises could be had, using the various craft in the harbor as enemy's vessels, sea-going steamers representing cruisers or battle-ships, while the smaller vessels passing near shore would be torpedo boats. These are only some of the exercises that might be had. Others would suggest themselves as the practice went on.

After the separate forts become reasonably proficient, combined work with the other forts in the harbor would be had, the officer in charge of the defense of the harbor giving the directions. These would be somewhat general in their character, but would be of great value, for only by concert of action can the best results be obtained, and for this, one head is necessary.

Exercises like the above are the best possible training for the artillery. We could by constant practice attain a familiarity with methods of fire control which we have not yet dreamed of. Moreover this practice would show the actual worth of many of the theories which have been advanced. If these theories were found to be carried out with difficulty in time of peace, they would certainly be useless under fire, and it is well to know this in advance. Practice may show us that absolute centralization of fire control cannot be attained; that more must be left to the man at the gun than some have thought; that the idea, "where you see a head, hit it," has more place in harbor defense than has been the commonly accepted opinion. At any rate, by trying we can find out a great deal about these things, which we never will by simply studying about it.

The subject of target practice is one that needs a passing notice. Our present system as a means of disposing of a certain number of projectiles and showing that we "have powder to burn," is excellent, and of course it has uses beyond this, but it falls short of its highest value. With targets fixed invariably at so many hundred yards distance from year to year, but little is really learned by firing shot after shot with so many similar conditions. Certainly some system could be devised analogous to the infantry skirmish firing, by which we could shoot either at moving targets or at fixed targets at irregular distances. The objection might be made that this would take time to set and reset targets, but in the first place our time is given to us for artillery work, and besides it is not likely that more time would really be taken. Now hours are often spent in trying to get a target within 100 yards of the right distance, whereas by the system

recommended, the target would be dropped, the tug would steam away to a safe distance, the range would be obtained, guns prepared for firing immediately, the desired number of shots fired, the signal given to the boat to change target, which of course would be done without trying to obtain any particular range, and the practice proceeded with. If the enemy's ships would be so accommodating as to anchor at let us say 3500 yards, our present practice with the 8-inch C. R., would be of some value, but these will not be the conditions of warfare. The competitive idea is the bane of our present practice. If all the shots were fired under something like service conditions without any attempt to apportion a fixed number, or at any rate an equal number, to each battery, we would get better results for actual service.*

There are many questions connected with the future of the heavy artillery which are of great interest and will profitably repay study and investigation, but I shall no more than advert to them now.

What shall be the construction and armament of our forts—shall the vertical or horizontal fire predominate—what are the best types of carriages—how shall the ammunition be made up—what improvements should there be in the sights—these are some of the questions of material which arise, and in the determination of which the artillery should have a large voice.

There is the very large and vital subject of organization: shall we have a corps or continue the regimental system; shall the light be separated from the heavy artillery; shall the batteries of heavy artillery be of the same size or divided according to the duties they have to perform; what shall be the proportion of officers in the different grades; shall the chief (for I suppose practically all of us are agreed there should be one) hold the position permanently or be appointed for a term of years?

Then what shall be our status with reference to the Ordnance and Engineers; shall there be three independent corps as now, or shall the artillery control the others as far as artillery matters are concerned? What shall be the relative places of the army and navy in harbor defense, and who shall control their combined efforts?

These and others are questions of great importance about which much might be written, but they are outside the purposes

* The writer may be a heretic on artillery target practice, but he has a great many companions in his heresy.

of this paper. What I have attempted to show in a general and necessarily somewhat superficial way, is the character of the work that artillerymen should do at the guns. In the event of foreign war, we shall be judged by our deeds. We may throw the responsibility for lack of means on other shoulders, but lack in skill we must atone for ourselves. It will not avail us after the event, if that be unfortunate, to say we did the best we could, if that best be not the result of the most careful study and assiduous practice in time of peace. Not every emergency can be provided for, it is true, and "the fortunes of war" will in the future as in the past play their part, but on them we must not rely.

THE HEATING OF AN ARMY POST BY ITS QUARTERMASTER.

By First-Lieut. J. B. McDONALD, 10th U. S. Cavalry.

THE heating of a post by its quartermaster presents difficulties not met with by those charged with the same task or expense in private affairs in civil life.

There the entire cost of plant, fuel, and repairs is borne by the party interested and its results are for his benefit, therefore as the best is usually the cheapest he secures the best plant for his purpose and the best fuel for the plant, thereby securing the best results.

Opposed to this is the army method, where the cheapest is sought and bought by order and contract in case of plant and fuel.

Having secured a plant an ignorant fireman is oftentimes placed in charge who proceeds to burn out grates and waste fuel in the many ways open to such proceeding. Could we expect results from this combination to compare with that obtained by business men in their factories or other houses with perfect equipments and the best fuel? They one and all claim that the same space, where stoves have been removed, is heated by less than half the amount of fuel in their steam heaters with much less work, reduced insurance rates, and no dirt, dust and ashes.

If these results are obtained, at large expense for the change, by corporations who are noted for economy, it must be cheaper in the end for them and should be for the army.

The fact that it is not needs explanation; for the Quartermaster General claims that it costs twice as much to heat the new barracks at Forts Thomas and Sheridan as it did the old barracks, with stoves.

In the first place I think sight has been lost of the two most important points to be considered, and in fact the only ones worth consideration, viz.: the *space* to be heated, and *the comfort* of the soldiers occupying that space.

If I have been correctly informed the space heated in these new barracks is at least four times that contained in the old ones, for which the fuel allowance, to be consumed in stoves, was fixed by Congress and the War Department.

This allowance was fixed for latitude, and not by cost, showing that the *comfort* of the men was the first consideration.

No doubt the actual consumption of fuel to heat those barracks was double what it was to heat the old ones, double the soldiers' allowance; but as the space was quadrupled this only proves that the claim of the Gorton and Lidgerwood Company, that the same space can be heated by half the fuel with one of their side feed steam heaters and radiators properly managed, is more than true. For to this quadrupled space must be added the heating of water for bath rooms, lavatories, and other comforts not contained in the old barracks. But I will show further on that this is a very modest claim of the boiler company.

To argue that steam is superior to stoves for heating is only a waste of time, as it is an accepted fact by all business men who do not waste money on uncertainties.

If it does, however, require more fuel to heat the modern barracks than the old ones, increase the allowance, for the soldier should be kept in reasonable comfort.

From all tests that have come under my observation there seems not a shadow of doubt that Fort Assiniboine, and all similar Western posts, can be heated by steam or hot water on less than the present allowance of fuel, the actual percentage depending on the kind of plant and attention bestowed upon it. If the best modern steam heaters are obtained and the proper attention given by intelligent attendants, under competent supervision, at least one-third of the fuel now consumed in stoves, with poor

results as to comfort, should be saved. For instance, in one of the newly constructed modern barracks in the Department lives a company recently removed from one of the old-fashioned, two-story, stove-heated, brick barracks. So far this winter this company has heated its barracks, bath and lavatory water and cooked its food on its allowance of fuel without the increase for weather below ten degrees Fahrenheit. These barracks contain a little more than four times the cubic space of the old ones, which last winter required all the allowance of fuel together with the increase for weather below ten degrees, and this company with the others in the post helped to burn more than the surplus accumulated by the post quartermaster in addition. Therefore the saving of one-third the allowance is a modest claim. In the other end of this double set of barracks another company of the same regiment is quartered, and during one month of the same period, in a heater of identically the same make and size, consumed just fifty per cent. more than its allowance of fuel, showing conclusively that no matter how perfect the plant may be unless a uniform, careful, intelligent management is obtained, waste so great will result that the War Department will be warranted in withholding these comforts from us unless we show ourselves capable of an economical management of them.

Whether this plant, when secured, should be placed under the immediate supervision of the post quartermaster with a competent civilian engineer to superintend and regulate the entire system, including valves and thermometers in company barracks, assisted by such number of extra duty firemen of sufficient intelligence, is a question that would probably have more opponents than advocates as usual in all army matters, which leaves us stranded on the bar of "No Army Legislation."

However, if all company commanders would take personal charge and see that only their quartermaster sergeants, and competent men detailed on daily duty to assist them, touched or fired the plant, and only enough fuel consumed to furnish the required amount of steam, this would be the most satisfactory and economical to the Government, for each company commander would have his own plant and no extra cost would be incurred for engineer and firemen. But we all know this would not work uniformly, for some of them cannot and others will not regulate such matters themselves, leaving it to incompetent and irresponsible attendants whose carelessness and ignorance cause more

waste and damage than is necessary to run the plant by competent, careful hands, and doubtless a separate plant for each barracks would be more satisfactory to troop and company commanders, and many of them would obtain the best results from this method which would relieve them of the idea that their prerogatives were being interfered with by the above method; but then careful and capable men are not always present to command their companies and in their absence the most careless subordinates in the army may be in charge of their plants and play havoc with them and their allowance of fuel.

Therefore the most economical plan, to remedy this, would be to put a single heater under each double set of barracks and the proper number of radiators in each, and give the post quartermaster a competent engineer and firemen, as suggested above, charging him with a careful supervision of the entire system assisted by his engineer. This would save the expense of so many separate plants, be more economical in fuel and in repairs caused by careless attendants, give more uniform heat in barracks, and no doubt conduce to the health and comfort of the men in a manner and to a degree not otherwise obtainable.

It is claimed by the manufacturers that a variation of twenty-five to fifty per cent. in the consumption of fuel by the best plants will occur under different careless managements, and this is shown in the case of the two companies above referred to, where one consumed about fifty per cent. more fuel than the other in the same month. Therefore it would seem that prudence, reason and economy point to some uniform method of careful, constant attention to all parts of the system; and as the great waste of heat by radiation from the long pipes for a large post condemns the central plant, I know of no other that presents so many points of economy and comfort as the separate plant for each double set of barracks under the supervision of the post quartermaster as above suggested.

The post quartermaster is usually present for duty, and if temporarily absent his engineer would care for the plant and the extra cost would be more than counterbalanced by the fuel saved and damage avoided.

In this post is a single story house containing as much cubic space as a two story set of officers quarters. This is an isolated building and every room is an exterior one. It is heated by an old-fashioned single-pipe steam heater, which keeps it much more

comfortable than the officers quarters, and does it on less than half the fuel required by the stoves in the latter.

Would it be extravagant to claim that with the best modern side feed heaters of the Gorton and Lidgerwood Company we could do as well? If so, with the present price of fuel, the plants for officers' quarters and barracks would pay for themselves in ten years and save five per cent. on the investment in the meantime.

Thus it has been shown that twice as much cubic space can be heated by steam or hot water, under careful management, as by stoves, and as there is no reason why we cannot do what others have done, and there is no doubt of its superior comfort—the only important consideration governing the authorities who fixed our allowance of fuel—let us hope that it will be no distant day that sees us enjoying these comforts in every western post.

MILITARY INSTRUCTION IN COLLEGES.

By First-Lieut. FRANK L. WINN, 12th U. S. Infantry.

THE live and unusual interest in military matters brought about by a number of grave internal and international complications following each other in rapid succession in recent years may be a lasting benefit to the country. Our military necessities are already more generally appreciated and there is an evident desire to meet them. The best guarantee of honorable and enduring peace will always be found in our ability to maintain by force if necessary the laws of the land at home and our rights among nations abroad. Our geographical isolation and comparative freedom from European interests are a source of great strength, but we cannot rely upon them entirely, although they save us from the necessity of a large and costly military establishment. Congress seems disposed as soon as the finances will permit to meet in part the demand for better military protection by providing the material of war essential to an adequate coast defense, but it is unlikely that the personnel of the army will be materially expanded. The main dependence in war will be upon the volunteers. The members and ex-members of the National Guard will naturally form the greater portion of the

trained part of the volunteers, but it is believed that no inconsiderable portion will consist of the graduates of the numerous military schools. There were comparatively few of these schools previous to the Civil War, yet their graduates established a deservedly honorable record for skill as well as courage on the battle-field. A distinguished officer recently paid a high tribute to one of the best of our military schools, Norwich University, Vermont. "When the general government called for men to suppress the great rebellion the student body responded with such unanimity that for two years the University did not have any graduates. I know of no other institution that can present such a striking and patriotic example of the spirit of loyalty and patriotism instilled in its students." (Col. Hughes Report of Inspection, 1893.)

It must be this institution to which the Inspector General refers in his report for 1892 as furnishing during the Civil War 12 general officers, 25 colonels, 40 field officers and 198 company officers.

I have no statistics at hand concerning the Virginia Military Institute, but it is well understood that a large number of the most distinguished Southern officers received their military training in that most excellent school, while the conduct of the cadet corps at the battle of New Market is a source of pride to all Virginians. It is not strange that statesmen, impressed in the early years of the war with the scarcity of trained military men among the people and the terrible cost and inhumanity of war as a training school, should see in the example set by the military schools of the day a plan by which the strength of the nation might be increased many fold.

Large grants of land were about to be made to the several states for specific educational purposes and it seemed wise to incorporate in the act the military feature. In this way it was believed that every state would in time be certain to have among its most intelligent citizens a considerable number versed in the elements of the art of war. Future calls to arms would bring among the first to respond in every community a sufficient number who would be able to intelligently train and lead the others. Many acres were given to the several states for "the endowment, support and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies and including *military tactics*, to teach such branches

of learning as are related to agriculture and the mechanic arts." Without interfering with the leading object, without encroaching upon the time required to secure a liberal education, it was manifestly the intention of this wise law to provide such a military training for the youth who sought the advantages of these institutions as would enable them to intelligently defend the country in time of war; patriotism, courtesy, habits of order and promptness, self control, ability to direct others, physical culture and subjects pertaining exclusively to military tactics were to be taught at a time when many of the lessons would be valuable as a preparation for any career the student might follow and at a time when the teaching would least interfere with the duties of settled occupation."

There are now 35 colleges in as many different states annually receiving aid from National sources; the largest amount, about $80,000, falls to the University of California, while the smallest amount received by any, $6333, falls to the Massachusetts Institute of Technology. They vary widely in grade and number of students; they include some of the best of our great universities, notably California, Cornell, Minnesota, Sheffield Scientific School of Yale University, Wisconsin, etc.; while others are purely agricultural colleges. All maintain military departments in which the amount and kind of instruction are as varied as the institutions themselves. Some have a military course approximating in standard to the grades of scholarship proudly maintained in other successful departments; others struggle with the military as an unruly but necessary bugbear and needless to say accomplish little.

The land grant institutions form by no means the majority nor do they perhaps include the most successful of our military colleges, although they should always receive the first consideration from the National Government. The law authorizes the detail of 100 officers as Professors of Military Science and Tactics, and a majority of the officers so detailed are located at institutions in which military instruction is voluntarily maintained by the college authorities and at nearly all the majority of the students in attendance are required to drill. The number of other schools in which some form of military training is maintained is not known but it is very large. Military drill has been introduced in the public schools in a number of cities. It is evident that a very considerable proportion of the younger generation is

receiving some form of military instruction, and while we cannot measure accurately their military strength by battalions as is done in the great powers of Europe, still it is very considerable. The number of students enrolled in the military departments of the 104 colleges at which officers of the army were stationed during the college year 1894-95 amounted to 19,564, a fraction over 50 per cent. of the male undergraduates in attendance. Surely the military education of so large a number of the youth of the land is a very important matter demanding the best thought and all the time available for the purpose.

It is very difficult to justly estimate the relative amount and value of the military training imparted at these institutions. At some the course is confined to a single class for two or three hours a week, while at others, modelled in part upon West Point, a system of discipline and drill scarcely less effective than that enforced at the Military Academy is maintained. The purely military schools naturally devote much more attention to the subject than the civil colleges and universities. The state institutions in the Southern States apparently more fully carry out the military requirements of the Land Grant Act than the corresponding institutions in the Northern States. The least time is given to the subject in some of the larger Eastern institutions while the Western colleges as a rule devote a reasonable amount of time to the military course.

The general character of the different courses is not so varied. Infantry drills in the school of the soldier, company and battalion are conducted at nearly all ; target practice, standing gun drill, signalling and sabre exercises are held at many. Camps and practice marches were participated in by the cadets of 18 colleges during the year 1894-95 and the duties of sentinels were performed at 42. Theoretical instruction is given in many subjects and differs widely in character and amount. It usually includes the Infantry Drill Regulations, Regulations and Customs of the Regular Army, and the Elements of the Art of War. This course is generally confined to one class for a single hour a week during one year.

The instructions for the guidance of officers on college duty published in G. O. No. 93, A. G. O., Washington, Dec. 27, 1893, state that the military course shall consist of at least two hours a week of practical work and one hour of theoretical work. The length of this course is not specially defined, but it is manifestly

the desire of the War Department to maintain a course broad enough to enable the students to obtain a military education that will be of practical value in war. This value will presumably be measured by their qualifications for the duties of officers and non-commissioned officers. How long must the course continue and of what must it consist to satisfy reasonable military requirements? It is recognized that the conditions prevailing at the different universities are so varied that the same course cannot prevail at all; yet as in any other course of study there must be certain elements in the military course that should be common to all. It ought to be possible to maintain at all the colleges courses embracing these essential elements; special and advanced courses could then be established wherever the conditions favored. Referring again to G. O. No. 93, we find that it contains a summary of the work that must form an essential part of the course at all the colleges. "The practical course in infantry shall embrace small-arm target practice and as far as possible, all the movements prescribed by the Drill Regulations of the U. S. Army applicable to a battalion. Instruction in artillery shall embrace as far as practicable such portions of the U. S. Drill Regulations as pertain to the formation of detachments, manual of the piece, mechanical manœuvres, aiming drill, sabre exercise and target practice. Instruction should also include the duties of sentinels and where practicable, castrametation. Such instruction shall be given by the Professor of Military Science and Tactics, personally or under his immediate supervision." Theoretical instruction shall be by recitation and lectures personally conducted and given by the Professor of Military Science and Tactics and shall include as far as practicable, a systematic and progressive course in the following subjects; the drill regulations of the United States Army, the preparation of the usual reports and returns pertaining to a company, the organization and administration of the United States Army and the elementary principles governing in the art of war.

The military school in which the students live in dormitories or barracks under control of the school authorities and are kept at all times under military discipline may properly find in West Point a model to be followed as closely as the main purposes of the school will permit.

The great majority of the colleges cannot subordinate their manifold interests to the military to such an extent as the success

of the military school feature would require, yet they are anxious to provide adequate military instruction if it can be done without interfering too much with other college exercises.

The following suggestions are made with particular reference to the conditions prevailing at the universities and larger colleges in which instruction in military science is required by the terms of their charters, as is the case in the Land Grant Institutions, and in which a curriculum leading to a degree in four years is maintained. The three hours per week of the War Department regulations are believed to be the minimum in which under favorable conditions satisfactory results can be obtained; at all institutions except those provided with large armories this amount will be reduced in practice at least one fourth. I would however employ this time somewhat differently by confining the main part of the theoretical instruction to the Junior and Senior years. The beginning of the college year always finds the cadet organization depleted and out of joint; the loss of the senior class and other withdrawals necessitates a complete reorganization. The well instructed men have completed the course; the new assistant instructors, the officers and sergeants, are perhaps selected and ranked, but they are necessarily green and inefficient; the new corporals are entirely untried. The freshmen recruits must be initiated at the very time the organization is weakest. This however is an inconvenience of which valuable use can be made. The freshman can be instructed in the school of the soldier by the candidates for the rank of corporal. The recruit instruction naturally falls to the corporal and in no other way in a short course can the latter apply his knowledge of the drill book and acquire the confidence and independence of action essential to the squad leader. By making relative rank dependent on the success obtained in fitting the recruits for the company a fair amount of rivalry is obtained. The recruits can be prepared for the company in from two to three months. During this period the new officers and sergeants should be learning the details of company and battalion drill by continuing the training of such of the older men as remain in the companies. By the time the recruits have joined their companies at least one-third of the college year will have passed. A thorough course of company drill varied with some of the usual ceremonies will occupy at least another third of the year. The remaining portion of the year will be required for the extended order and battalion drills. I

have obtained fair results from 50 exercises (two a week) divided in this way and believe that with one additional exercise each week a great improvement would result; and perhaps some of the time could be used for practicing simple exercises in minor tactics. In the second year all those cadets who have shown sufficient aptitude should be ranked as corporals and assigned to the instruction of freshmen and other duties of squad leaders. The entire year is certainly short enough in which to master the drill duties of corporals. The second year privates very probably remain in the ranks to complete their own instruction and to furnish the nucleus of steady well-drilled men about whom the new company is formed. The older cadets can also be instructed in aiming and sighting exercises, gallery practice, range practice, the ceremony of guard mounting and some of the duties of sentinels (if a guard is not regularly maintained) during the first term while the companies are small. All cadets should be required to study their Drill Regulations in connection with the practical work. Their knowledge may be tested by examinations at the end of the year. Such examinations would naturally be competitive in determining relative rank of non-commissioned officers. The end of the second year should mark the completion of the course of elementary drill. The corporals who are qualified become sergeants in their junior year and thus enter upon an enlarged and varied course of work, the essential school of preparation for the grade of officer. The privates of the junior class should also be promoted to such new and advanced courses as the Department may provide. It must be expected that many will become tired of the monotony of the ordinary drill, that others will be disappointed in not receiving the coveted chevrons, and that a few men will vehemently espouse the cause of down with "militarism."

Institutions in which the cadet corps is held in high esteem, in which the uniform is worn with pride, and in which the general college sentiment is favorable to military ideas will have little difficulty in dealing with the dissatisfied and disloyal. If it is not the thing to kick there will be less kicking. Any open and offensive manifestation of opposition is generally an indication of lack of discipline. This should be met by not only such sound corrective measures as the established methods of the college permit, but also by diverting the attention of the student to new and enlarged phases of military activity. Every effort should be

made to retain the interest which can hardly be done by confining the instruction of the privates to fours right and left during the junior and senior years.

Following the practice of a great number of our large universities I would offer to the junior and senior classes a choice of as many courses as the number and capacity of the students and the facilities of the department permitted. Most important of all would be the officer's course, consisting of two years practical work in the grades of sergeant and officer, supplemented and accompanied by a course of reading and lectures corresponding in part to the theoretical course as now given in many universities and including all the subjects mentioned in the War Department instructions.

Many engineering students would be glad to avail themselves of a course in military engineering. Such a course should include theoretical and practical work and embrace field fortifications, permanent works, siege operations, military bridges, topography, and perhaps in some cases submarine mining. Students pursuing this course might belong to an engineer company divided into two sections, one consisting of juniors and the other of seniors. The classes would attend at different hours for theoretical work and be united for the practical engineering work and for such other drills and ceremonies as were deemed advisable.

A course in artillery might be offered. The manufacture of gunpowder and high explosives, gun construction, projectiles and armor, small-arms and machine-guns are subjects that will appeal to many students more forcibly than a continuation of perfunctory drill. Drills in artillery in amount and character depending on the equipment of the department would constitute an important part of this course.

The great need of courses in engineering and artillery cannot be too strongly emphasized. They would provide men who at the outbreak of war could be entrusted under the direction of regular officers with the care and service of the costly forts and complicated ordnance constituting our coast defenses. The National Guard has not yet entered this field to any extent; but with graduates of these courses in their ranks, attention would undoubtedly be turned to the necessity of providing troops of all branches of the military service for the militia.

A course in cavalry should not be omitted. Perhaps in some places the *éclat* attached to this branch would induce many stu-

dents to hire horses for a considerable number of exercises and at others the authorities may in time help in this matter. Even without horses a good theoretical course could be established supplemented with drills in the use of the sabre, dismounted formations, reconnoissance and route sketching. In the smaller colleges the students pursuing the special courses might be united in a single company or detachment for drills and occasions of ceremonies; in all of the colleges some of the time might be profitably devoted to practical exercises in minor tactics.

The attending physician might, in connection with the military department, offer a course in hygiene, military sanitation, first aid to the wounded and hospital organization. All courses should be in keeping with the advanced and progressive work in other departments of the college and even if very crude in their beginnings they would command the respect and goodwill of the students and professors. Surely the most prejudiced would find some one of these subjects interesting and valuable. A credit value equal in all respects to that accorded other courses should be given to each of the military course including those in drill. These courses are not at all dependent upon the attendance of a large number of students; in fact at present, it is only in some of the smaller colleges that complete courses in any of these branches are offered. Whatever the number of students, in the arrangement proposed, there will be privates in the junior and senior classes who would prefer to take advanced work rather than continue to drill over the ground of the first two years.

It will be said that in the larger institutions the officer already has his hands full; but this is only in part true, as many officers find time to instruct in other branches. The chief difficulty is not in the amount but in the arrangement of the time. The schedule is frequently a source of trouble to arrange and the military hour a difficult one to place on account of the large number of students concerned. The convenience and comfort of the majority might well be considered in selecting this hour. In the smaller colleges and in some of the universities an arrangement of time could no doubt be made that would enable the officer to personally instruct in the special branches. Moreover the ordinary drill could undoubtedly be much improved at the larger institutions if the students were divided into two or more sections alternating in their hours for drilling. Assistant instructors would fill a want long felt in military departments containing

large numbers of students. Forty-seven colleges are reported as having between one hundred and two hundred military students in attendance at each, sixteen between two and three hundred and seventeen over three hundred. Assistants are freely employed in other departments yet the military which as a rule contains more students than any other is forced to do without such assistance. It would not be difficult to obtain men who would make a success of some of the special courses suggested and would at the same time be of invaluable assistance in the infantry drill and in the office. Recruits and companies in the National Guard are drilled by officers and non-commissioned officers who remain in the same grade for many years and who become thoroughly versed in their duties; while in military colleges it is too frequently the case of the blind leading the blind. Some of the assistants might be selected from among the instructors of other departments who for a slight increase in compensation would be glad to perform the additional work. The fact that as a rule the cadets standing highest in the military course rank among the best scholars, should make the selection of such assistants from among the graduates easy of accomplishment. They would do much toward systematizing the work and continuing it on progressive lines without the breaks now incident to changes in details every four years.

The scheme of instruction suggested herein is designed to remove some of the adverse criticisms which a purely drill course encounters, while enlarging the scope of the work and increasing its usefulness.

Military departments have existed many years in institutions in which they (the departments) have not enjoyed general popularity among the students. Perhaps from the very nature of things they never will be entirely popular in civil colleges, but I believe that the raising of the standard to the best of other university work will do much towards removing some of the causes of irritation.

It is admitted that better results would be obtained if the students in sufficient numbers would volunteer for the military course and continue it until successfully completed, but in practice this plan has generally failed. The course must be compulsory and "the best results appear usually where all classes take the military course and it counts as much as any other duty." "If students are excluded from the officers control except for a few

hours in a single year or two, all can understand that perhaps not very much of permanent value may be driven home to stay, especially if the whole course is rather condescendingly treated as a matter suited only to the lower classes." (Reports of Inspector General.) The best officers will be found in the senior class; the ability, dignity and prestige required to control others must be found in that class; and in order to obtain such men in sufficient numbers and from among the most capable all seniors should be required to take the course. If it is optional, some of the best men will voluntarily undertake the work; many others hardly less desirable will drop out. The pressure of other work, disappointment in ranking, the unpopularity of the drill, the extra expense and the tendency to follow the line of least resistance will inevitably deprive the department of many excellent officers. The sergeants in the junior year will surely work harder and accomplish better results if there is considerable competition for the several grades of the commissioned officer. The extent of the rivalry will depend upon the value of the office. Cadets as a rule will prefer to work for an office to drilling as privates, particularly if the course is continuous with their college career. The privates will have completed the course in infantry drill at the end of their second year and should be permitted to select one of the several courses already described for the remainder of their stay. Their lagging interest would thus be restored and their time more profitably employed. The experience at many colleges accords with the views maintained in this paper regarding the necessity of keeping all classes in the department.

Colonel Hughes reports the practice at Sheffield Scientific School, where the drilling is largely confined to seniors, as altogether unsatisfactory and "cannot resist saying that it would harmonize much better with my ideas of the best service for the Government if these seniors were employed in giving the freshmen a course of good practical instruction in military tactics."

In the report from the University of Illinois for the year 1893 attention is called to the difficulty of obtaining officers and non-commissioned officers on account of the juniors dropping out because of the pressure of other work; and it is stated that "these changes disarranged and seriously impaired instruction."

Major Sanger's report of the inspection of the Agricultural and Mechanical College of Kentucky for 1893 contains the follow-

ing: "The main obstacles to the complete success of the military department of this institution are the failure to place it on the same footing with the other departments of instruction and the exemption of the senior class, whereby the influence and experience of the older students are rendered unavailable in the appointment of cadet officers."

The report on the University of Tennessee states: "The main, in fact the only, difficulty which now affects military instruction unfavorably is the exemption of the two higher classes, whose influence and experience as officers and non commissioned officers is most essential."

Concerning the course at the Massachusetts Institute of Technology, Colonel Hughes says: "As this organization now stands the officers are selected from the class under instruction in the practical work. This is a case in some measure of the blind leading the blind." He recommends that the officers be taken from the upper classes, saying that "it would certainly tend to better instruction and a better discipline in the drill."

DISCIPLINE.

No subject connected with the course presents so much difficulty as that of military discipline, yet it is far and away the most important. If the cadet can be taught that regular attendance at duty, obedience to lawful orders and a prompt, exact and cheerful attention to the rules and customs governing the cadet body are essential to the successful completion of the military course much will be gained. It is not enough, as so many seem to think, to do good work when in attendance, to make up deficiencies in subsequent years, and to "cut" when convenience or distraction suggest. Habits thus formed will cling through life and utterly unfit the man for military responsibility. What if the drill is irksome and monotonous? The graduate, unless he is specially favored, will find that in the keen competition of life the first thing he will have to learn will be to do many things he does not like to do.

There is little if any trouble with the great majority of students in the matter of discipline, but there are always a few whose influence is bad. The delinquincies of the few, however, are contagious and if allowed to continue unchecked bring about a general lowering of the percentage of attendance and the quality of the work. Very grave breaches of discipline are rare and

as a rule can be punished through the regular college channels, though they are sometimes rather slow and unsatisfactory for military purposes. There is probably in some colleges a decided objection to punishing cadets guilty of purely military offenses; in others a lack of knowledge of the military requirements is responsible for unsatisfactory measures; in very few, excepting the military schools, is there an entirely satisfactory system of military discipline.

The great difference between military discipline and civil discipline should be officially recognized by the college authorities and provision made for enforcing the former in all matters relating to military duties. I believe the failure to recognize this difference and to provide a suitable system of rewards and punishments is responsible for the greater part of the dissatisfaction and friction reported at many colleges. Compulsory military training without effective punishments for all breaches of discipline from the slightest to the greatest is in my opinion fatally defective and contrary to all precedent.

It is a fact that many officers achieve sometimes under discouraging circumstances, good results largely by personal influence and unusual tact; but this is not a sound argument in opposition to a system of admitted necessity in other military bodies. It is not sufficient to allow cadets to remain in the department continuously committing the same petty violations of regulations and mark them deficient at the end of the term, even if they are required to repeat the entire term's work. The benefit of an immediate example is lost; besides this would result in some being deprived of their degree or else forced to remain an entire year at the college to make up a military deficiency. This would be a hardship frequently out of proportion to the offense and it would not at all meet many cases. Moreover many faculties would be loath to enforce it. These abuses will never be entirely eradicated unless the commandant is entrusted with sufficient authority to summarily punish in an effective way minor breaches of military discipline. Unless the college authorities give him such power, it is difficult to understand how he can effectively enforce the rules* prescribed by the President concerning organi-

* 1. "All rules and orders relating to the organization and government of the military students; and all other orders affecting the military department excepting those relating to routine duty, shall be made and promulgated by the professor of military science and tactics after being approved by the president or other administra-

zation and discipline, at institutions containing large numbers of cadets.

The student officers should be encouraged to investigate charges and recommend in accordance with established rules the character and amount of punishment. This should be of a military character and consist of fine, confinement, deprivation of privileges, extra duty or such other military punishments as may be applicable. The failure of military drill without discipline to inculcate habits of order, promptness and obedience is inevitable. Instructors who are not familiar with the many benefits to be derived from an effective military training naturally take little interest in a course which seems foreign to recognized university precedents and of little advantage to the student in other courses of study. On the other hand instructors and others who have profitably pursued the military course as a rule strongly favor it, not only on patrotic grounds, but because they believe the discipline is good for the college and of practical benefit to the man.

The military course cannot be expected to achieve the best results at the institutions in which the faculties are divided as to the propriety and value of such instruction. The authorities instrumental in establishing the military course in such institutions should see that the control of the department, especially in matters of discipline, is placed in hands friendly to military instruction.

EQUIPMENT.

Some of the colleges are handsomely supported by public or private endowment or both; many are in a state of financial distress, but surely it is not too much to expect that the equipment of the military department shall be in every respect as good as that of other departments. The Government provides the commandant and the arms, a very substantial part of the equipment; it has a right to expect that proper provision shall be made for their best use. Colleges receiving government aid should certainly contribute a fair share of this fund to military purposes. In a recent debate in Congress, a Senator in opposing a measure involving increased military expenditure pointed to

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tive officer of the institution. 2. It is the duty of the professor of military science and tactics to enforce proper military discipline at all times when students are under military instruction, and in case of serious breaches of discipline or misconduct to report the same to the proper authorities of the institution, according to its established methods." (G. O. No. 93 A. G. O. Washington, Dec. 27, 1893.)

the fact that Congress annually appropriated a large sum for colleges which are required under the Land Grant Act to provide military instruction. How small a portion derived from the land grant is devoted to military purposes is well known. The college authorities too frequently assume that the War Department provides all that is necessary, while the War Department looks to the college or State to make adequate provision; and among the three the Department's interests are constantly being overlooked. Handsome armories have already been erected at some of the colleges. The immediate needs of many include armories, provision for camps and marches, salaries for assistants, target ranges, uniforms, books, models, maps, instruments, equipment for bands and special organizations. The students in nearly all of the colleges buy their own uniforms. This involves some hardship but it should be considered very slight in institutions where the tuition is free. State cadets might well receive the same allowance for uniforms that the National Guard receives. Pride in the uniform cannot be expected when the uniform is illy made, ugly, of varied shades and cut and in all stages of repair. It is not reasonable to expect a single uniform to last a growing young man for three or four years, and to permit the freshmen to appear in the uniform that has already been through the mill of a four years' course is ridiculous. The contract plan by which all uniforms are made by a single firm in accordance with suitable specifications is generally adopted by military bodies, and as a rule with satisfactory results. In some States the cadets of the State colleges have been attached to the National Guard. This affiliation should be of benefit to both. The cadets being in close touch with army methods may be expected to become the model organization of the State and the college the seat of professional preparation for officers of the guard. Special organizations such as cavalry, artillery, and engineers could be more economically located at the college, and in the long run a greater number would enjoy the advantages of the State's assistance.

The cadets of 18 colleges enjoyed the advantages of a camp during the year 1894-95, and practice marches were conducted at 30. One officer is quoted by the Inspector General as follows: "As camp drew towards a close the cadets begged to remain another week, but as I had promised the college authorities to return, I did so on the seventh day. Tents were struck and al-

lowed to fall together by drum taps, as done at West Point. I consider the one week in camp to have done more for my military department than the preceding two years of routine work." There can be no doubt as to the military benefit to be derived from instruction of this character and in time all the colleges organizations may be expected to participate.

The camp duties may very properly embrace the practical exercises essential to a proper understanding of the duties of extended order, advanced guards, rear guards, outposts, patrols and reconnoissance, and other duties that cannot be practiced during the term. Camps and marches involving a happy proportion of freedom, fun and military duty will do much towards popularizing the department at the college and raising it in the esteem of the people at large.

The course here outlined makes no provision for physical culture beyond what is incidental to the regular drill. There is a growing sentiment in favor of greater attention to this very important subject for its own sake; its close relation to the military course is fully recognized. It is believed the best results will be obtained in a properly equipped gymnasium under the direction of skilled instructors. A half hour a day for two years at least, devoted to a systematic and progressive course of exercises is essential; at the end of that time the majority may be expected to feel the great benefit to themselves and to continue of their own accord some form of physical culture. An elastic step, erect carriage and soldierly bearing are easily acquired by men of average physique pursuing a combined course of drill and gymnasium exercises if the desire to acquire is sufficiently strong; otherwise the results are very apt to be disappointing.

It is said that an officer who accepts a college detail must cast aside all army notions on drill and discipline. This is true so far as the possibility of transforming a civil college into a miniature West Point is concerned, but the army must furnish the model for college drill as it does for the National Guard and the extent to which both copy the model will be the measure of their military efficiency. If citizens of all ages and occupation are able to join volunteer organizations and devote sufficient time to volunteer drill to make their corps the pride of the community and in places the rivals of the Regular Army, surely students enjoying the benefits of a public institution, in many cases free of tuition, should cheerfully devote a reasonable amount of time to better

prepare themselves to defend their country in time of war. It is believed that the parents of a majority of the students feel that a reasonable amount of drill and discipline is good for them; the public generally believe in the militia system of defense. One hundred officers are engaged in this work at as many different colleges; it is understood other colleges are applying for details. A greater number of officers, many think, cannot be detached from their regiments without serious injury to the service. The result as foreshadowed in the last report of the Adjutant-General of the Army will be the gradual withdrawal of officers from institutions not providing opportunities for adequate instruction. The establishment of a scheme of instruction sufficiently comprehensive to answer the military requirements yet elastic enough to fit the peculiar conditions of different colleges would materially further the interests of military instruction. If such a scheme provided for instruction throughout undergraduate status and for the punishment of military offenses under direction of the commandant according to some approved system, it is believed the resulting improvement would in a reasonable time disarm much of the opposition which the changes would at first encounter.

THE ARMY MEDICAL MUSEUM AND THE LIBRARY OF THE SURGEON-GENERAL'S OFFICE.

By CHARLES SMART, Major and Surgeon, U. S. A.

THE Army Medical Museum, which has now a world-wide reputation, had its beginning during the Civil War. Surgeon-General Hammond, in a circular published in May, 1862, announced the intention of establishing an Army Medical Museum, and requested medical officers to collect specimens of morbid anatomy, medical and surgical, which might be regarded as valuable, together with projectiles or foreign bodies removed and such other matters as might prove of interest in the study of military medicine and surgery. Later circulars gave more explicit instructions regarding the collections to be made; and in a short time thereafter an immense amount of material illustrative of gunshot fractures and the lesions of camp diseases was sent to Washington from the field and general hospitals throughout the

country. The work of preparing, arranging and cataloguing these specimens was carried on actively under the superintendence of Surgeon J. H. Brinton, U. S. Volunteers, who was the first curator; and in April, 1867, the museum was opened to the public in the Ford's Theatre building in which two years prior to this, President Lincoln was assassinated. At the same time a small number of copies of an illustrated catalogue was printed for use in the museum and for exchange with other museums and scientific bodies. The entire number of specimens then catalogued was 8542. At this time also the museum and library received official recognition from Congress by the authorization of certain expenditures in their behalf among the miscellaneous expenses of the Medical Department.

The value of a printed catalogue to a museum is very great, as it is by its means that the collection is made available to scientific students, the majority of whom can not personally examine the specimens, and by diffusing a knowledge of the contents of the museum it leads to voluntary contributions to the collection. A full catalogue of this museum is a want that has long been felt. Partial lists have been published at times, as in 1876 a check list of the preparations and objects in the section of human anatomy for use during the International Exhibition, and in 1880 a list of the anatomic specimens for distribution among army medical officers and anatomic students and correspondents. The Surgeon-General has on several occasions urged the publication of a catalogue; in 1873 and again in his annual reports for 1886, 1887 and 1888. His want of success on these occasions no doubt accounts for the fact that no effort has been made recently in this direction. It is unnecessary to speak of the practical utility of the museum in these columns, for medical men can easily appreciate this. To army medical officers it affords a field of study indispensable to the acquirement of the fullest knowledge of the special duties required of them. The illustrations of military surgery and camp diseases contained in it have greatly promoted general professional knowledge on these subjects; and woodcuts of many of its specimens have found their way into works on military medicine and surgery. There is no doubt, however, that the educational value of the collection would be greatly enhanced by the publication of an illustrated catalogue. Much of the material for such a catalogue is already on hand.

As a knowledge of the existence and scope of the museum be-

came diffused, many of the officers of the army outside of those belonging to the medical department, and practitioners in civil life, sent contributions to it, so that the Surgeon-General was no longer able to speak of "the pardonable pride which he took in the reflection that this important collection had been accumulated through the unaided zeal and industry of the medical officers of the army." Army officers sent specimens of natural history, stone implements and other objects of archæological interest, all valuable as objects of exchange with other museums, while civilian practitioners sent specimens more strictly pertaining to the province of the Army Medical Museum. Exchanges have been made with the Smithsonian Institution, the Agricultural Department, the Museum of the College of Physicians, Philadelphia, of the New York Hospital, the Peabody Museum at Cambridge, Mass., the Blackmore Museum in England, the Anatomical Collection at Oxford, England, etc. To the energy and ability of Drs. Woodward and Otis, both of whose too short lives were mainly devoted to the building up of the Army Medical Museum and to professional work associated therewith, the Army Medical Department and the medical profession owe the successful issue of an undertaking which is now a credit to the country.

The Army Medical Museum was housed in the old Ford's Theatre for over twenty years. The building was utterly unsuited for this purpose, even had the whole of its space been available for the display of the specimens. As it was, the museum was confined to the third floor, lighted mainly by skylights, the library being packed two and three rows deep on the shelves of the floor below, while the Hospital Records of the Civil War, with the clerks at work on them, occupied the ground floor. The growth of the museum, and particularly of the library during these years manifested the inadequacy of their quarters. In time there came to be no room for even the storage of books and specimens, not to speak of facility or reference or advantageous display. Moreover, the danger from fire was considerable, although the best care was taken by the officer in charge to prevent such a calamity. The building was closed in on three sides by inflammable tenements and sheds on property over which this officer had no control. Besides, the weak walls of the theatre, which were cracked and markedly out of plumb on the east, suggested that in case of fire there would be an utter destruction as the walls would assuredly fall. A fire in 1875 in the adjoining

buildings emphasized the danger to which the library and museum were exposed and recalled how the Smithsonian Institution suffered in 1865. The damage to the Patent Office in 1877 increased the anxiety for the safety of the collections in the Ford's Theatre building so that in 1880 the President of the United States considered the subject of such importance as to embody a recommendation for a fireproof building in his message to Congress. He said:

"The collection of books, specimens, and records constituting the Army Medical Museum and Library are of national importance. The library now contains about fifty-one thousand five hundred (51,500) volumes and fifty-seven thousand (57,000) pamphlets relating to medicine, surgery and allied topics. The contents of the Army Medical Museum consist of twenty-two thousand (22,000) specimens, and are unique in the completeness with which both military surgery and the diseases of armies are illustrated. Their destruction would be an irreparable loss not only to the United States but to the world. There are filed in the Record and Pension Division over sixteen thousand (16,000) bound volumes of hospital records, together with a great quantity of papers, embracing the original records of the hospitals of our armies during the Civil War. Aside from their historical value, these records are daily searched for evidence needed in the settlement of large numbers of pension and other claims, for the protection of the Government against attempted frauds, as well as for the benefit of honest claimants. These valuable collections are now in a building which is peculiarly exposed to the danger of destruction by fire. It is therefore earnestly recommended that an appropriation be made for a new fireproof building, adequate for the present needs and reasonable future expansion of these valuable collections. Such a building should be absolutely fireproof; no expenditure for mere architectural display is required. It is believed that a suitable structure can be erected at a cost not to exceed two hundred and fifty thousand dollars (250,000)."

A bill authorizing the construction of a fireproof building passed the Senate in 1883, and was favorably reported from the proper committee to the House of Representatives, but no final action was reached at that session. Ultimately, March 2, 1885, an appropriation of $200,000 was approved; but as the original plans were based on an estimate of $250,000 many changes had

to be made involving a reduction in size and the omission of ornamentation. The site selected was in the Smithsonian grounds where they are traversed by Seventh Street, having as its neighbors on a line westward the National Museum, the Smithsonian Institution, the Agricultural Department and the Bureau of Engraving and Printing. The museum was opened to the public in its new quarters in February, 1888. On June 30, 1894, it contained 32,269 specimens; of which 12,249 were pathologic, 4376 anatomic, 1717 illustrative of comparative anatomy, 12,033 microscopic and 1894 miscellaneous.

While the success of the museum was assured almost from the first by the inflow of specimens from the hospitals of the Civil War, the progress of the library was slow in its earlier years, and but for the unremitting care and able management of Dr. John S. Billings it would certainly have succumbed to some of the many accidents and harmful influences that are prone to assail the infancy of such undertakings.

The nucleus around which the library has been crystallized was the few books of reference and text-books on medical subjects that had gradually accumulated in the rooms of the Surgeon-General's office. A catalogue published in 1865 contained the titles of only 1800 volumes. As stated above, in 1867, certain expenditures were authorized for the library out of the appropriation for the miscellaneous expenditures of the Surgeon-General's Office. Since then, both the library and museum have met with kind consideration at the hands of the Appropriation Committee, the usual sum carried by the Army Appropriation Bill for the former being $10,000, for the latter $5000. For the current year, however, the sum for the library was reduced to $8000. One of the first special efforts of the librarian was to make the library as complete a storehouse of American medical literature as possible. To this end he collected and perfected the files of all the medical journals published in this country since 1798, making an index on cards of the subject titles of all the original articles found in them, for the convenience of those who desired to consult the literature of any special subject. The articles in current medical journals and volumes of transactions were indexed on reaching the library, and the work of completing a card index for all the volumes already accumulated was carried on as steadily and rapidly as was permitted by the clerical aid available for the purpose.

An alphabetical catalogue of authors was published in 1874, when the library contained about 25,000 bound volumes and 15,000 pamphlets. It was then the largest medical collection in this country. Its records show the friendly interest that was taken in its progress and work by physicians in all parts of the country, and testify that even then it succeeded in a most satisfactory way in meeting all the demands made upon it.

In 1887 the work of cataloguing the original papers in medical journals and transactions was completed for all that class of literature that the library then contained; and the classifying of the titles under the proper subject headings and combining them with the titles of books to form a complete index to the collection was also effected. During the previous year some copies of a specimen fasciculus of a proposed Index Catalogue were printed and distributed, in order to obtain the opinion of those competent to judge whether it was desirable that such a work should be published, and if so, to elicit criticisms and suggestions as to the form of catalogue that would be most acceptable and useful. The responses, consisting of letters, resolutions of societies and editorial and critical notices, were numerous and not only favorable to the general plan as proposed, but unanimous in the expression of the opinion that the whole work should be published as soon as possible, it being regarded as of the utmost value to medical writers and teachers not only of this country but of the world. Congress acted favorably on the proposition, and the result is that to-day the medical profession is enriched with a magnificent set of volumes of author and subject titles in a single alphabetical series which will shortly be completed by the issue of the last, the sixteenth volume. The first was issued in 1880, and every year since then, until last year, one volume was added to the set. The completed catalogue will contain about 170,000 author titles, the same number of subject titles of books, and about 525,000 subject titles of pamphlets.

When the first volume of the Index Catalogue was published the library contained 51,500 bound volumes and 57,000 pamphlets. Since then the number of bound volumes has been more than doubled and of pamphlets much more than trebled. The early volumes of the catalogue therefore show only one-half, or less than that, of the present wealth of the library. To remedy this, Congress has shown its appreciation of the work by authorizing the issue of a second alphabetical series, supplementary to

the first, which will probably be completed in five volumes similar in size and style to those already issued. Meanwhile, as supplementary to the catalogue, the sixteen volumes of the "Index Medicus," edited by Dr. Billings and his learned collaborator, Dr. Robert Fletcher, have been of the greatest value to the literary workers of the medical profession. It is greatly to be regretted that this monthly exponent of the progress of medical science may possibly die for want of financial support. Its condition has recently been noticed extensively in the medical journals. As its continuance is of importance to the whole medical profession, the present writer does not see why it should not be in order for the American Medical Association to come to its rescue and continue its publication from the office of the *Journal*. In this way any financial loss would be generally distributed among those directly or indirectly benefitted.

The Index Catalogue has given a wonderful impetus to medical literature and education in this country, as it has placed the valuable stores of the library within easy reach of those who are qualified to make use of them. Formerly, when any one desired to become acquainted with the knowledge already acquired by the profession on some special subject, he frequently gave up the effort at the outset as he appreciated the difficulties and oftentimes the impossibility of gathering together the various articles already published on the subject. The bibliography appended to a journal article was often to students of the subject the most valuable part of a contribution. Now, all this is changed. The student has merely to turn to the Index Catalogue and the desired literature is before him, with many hints to guide him in the selection of the volumes that bear especially on his inquiry. The volumes themselves may be obtained by applying through the custodians of public libraries; and in some cases books that can easily be replaced have been sent direct to the applicant on the deposit of a sum sufficient to cover their market value.

It has, however, been found needful recently to impose some restrictions on the loaning of books, particularly of standard authorities and volumes of journals that are in constant demand. As the number of readers in the library has increased, it has more frequently happened that requests for certain volumes could not be complied with on account of their absence on loan. The interests of those who come to the library to prosecute their studies should not be sacrificed for the sake of those who ask the library

to come to them. To be able to accommodate both parties, Dr. Billings is endeavoring to procure duplicates of those standard works, journals and transactions that are in general request. Moreover, the wear and tear of years of use is beginning to tell on many of these and to render their duplication needful. Contributions of the character indicated would therefore be of much value; and the writer of these lines trusts that those who have read thus far will make a note of this and aid the library in this desirable extension of its field of usefulness. Its friends need have no hesitancy in duplicating works already on hand, as the spare copies can always be made of use in effecting exchanges.

It is time, however, to say a few words concerning the present quarters of the library and museum. The building is of red pressed brick, E-shaped, and severely simple in style. The main building fronts on B Street, the wings project into the mall. This is a mistake, as all the other public buildings in the vicinity front on the park. Hereafter when it becomes needful to enlarge the establishment this mistake will no doubt be rectified. The main building is 125 x 55 feet, the wings each 60 x 131 feet. Under both is a basement eleven feet high which affords magnificent storage rooms.

The ground floor is traversed by a central corridor, clean, white, smooth and unadorned, on either side of which are doors leading into rooms of various sizes. On the western or left side of the entrance are rooms occupied by clerks of the Record and Pension Office of the War Department. On the right are the lecture rooms and sanitary laboratory of the Army Medical School, the work room of the pathologist and the chemic laboratory where guard is kept over the purity and strength of the medical supplies furnished to the department. One of the rooms on this floor is given up to specimens of syphilitic disease unsuited for display in a museum open to all comers; another has been fitted up recently with various forms of stretchers, wheeled litters, cacolets, travois and other means of carrying sick or wounded men. Opposite the entrance a wide stairway of iron, carpeted with thin rubber, makes a semi-circular sweep to the second floor. The corridor of the main building on this floor opens on the west into the museum hall and on the east into the library, the rooms on either side being used by the clerical force of the latter. One large room adjoining the library is fitted up as a reading room for those making personal use of the books, and

has on its shelves such works as are in everyday request. The floors throughout the building are of brick between rolled iron sheeting.

The rooms on the third floor are occupied by those connected with the work of the museum. The bacteriologic laboratory on this floor is well outfitted and has an excellent northern exposure for microscopic work. Such of the attics as are not required for photographic work are used as storerooms.

The whole of the eastern wing from the second floor level to the roof is occupied by the library. This fine hall, thirty-one feet to the eaves and forty-seven feet to the ridge, is lighted by high windows and skylights in the risers of the ridge. The south end of the hall near the entrance from the corridor presents a large floor space which supports only a few desks, chairs, revolving book stands and large tables for the convenience of visitors in consulting atlases and other large works of reference. On three sides the whiteness of the walls between the window spaces is relieved by large oil paintings of some former Surgeons General of the Army,—Tilton, Lovell, Lawson, Finley, Barnes and Crane, with portraits also of Bichat, John Hunter, Morton and Physick, and many photographs and engravings. On the fourth, the north side, this clear space is closed in by what looks at first sight like a solid wall of books in red leather bindings. On closer inspection the wall becomes resolved into a three-storied framework of perforated iron, each story seven and a half feet high and extending along the length of the wing to its northern wall. Narrow iron stairways permit of communication between the stories and narrow corridors between the sections of the structure, each section being fitted with adjustable shelves of hard oak, filled with books or with file cases containing pamphlets. The estimated capacity of the library is 179,000 volumes. On June 30 of last year there were supported on its shelves 114,567 bound volumes and 183,778 unbound pamphlets and papers. The former comprised 72,090 medical works, 33,297 volumes of medical journals, 4913 of transactions of societies, 1663 of theses and 2604 of pamphlets. The latter consisted of 56,218 theses and 127,560 pamphlets. The binding of these into volumes depends on the means available. In 1893, 630 pamphlets were bound into 128 volumes and last year 2802 into 343 volumes.

These books are all devoted to medicine and its collateral branches. No purchase is made for the library of books belong-

ing to general or miscellaneous literature. It has all the costly illustrated medical works and anatomic atlases. It has also a valuable collection of the medical classics and a number of the rarities and curios of medical literature; but the aim has ever been to make it a storehouse of the medical thought of the present day rather than a collection of works that are of interest only from a historical point of view. The library is by far the largest of its kind in the world. This is gratifying to us; but we can take a much greater pride in the thought that of all such libraries it is the one which is most available for and most used in the current work of medical progress.

The museum hall in the west wing has a floor and cubic space equal to that of the library, but the two halls differ widely in general appearance. The contents of the museum are disposed in open order as contrasted with the compact shelves, tiers and sections of the library. The specimens are arranged in glass show cases, each about twelve or thirteen feet long, two and one-half feet wide, and eight feet high, which project into the body of the hall from the side walls, but with ample space for light and movement between adjacent cases. On the third floor level is a gallery which projects beyond the ends of the show cases below, but does not interfere with the light from the skylights in the ridge. The gallery is reached by a stairway at each end of the hall, as well as by a door opening from the corridor of the third floor of the main building. Some flags are draped from the face of the gallery, conspicuous among which is the hospital flag of all the armed nations of the world, the Red Cross of the Geneva Treaty.

The first thing the visitor must do on entering this hall is to record his name on the visitor's book. In 1893, 85,000 persons did this; last year 50,000. Most of these were merely sightseers; but the interested and appreciative student is always among them.

One would suppose that when over 32,000 specimens are the subject of inspection and report, it would be difficult to select the materials for a short journal article concerning them; but a very brief examination of the hall shows that the system adopted in the display enables the observer not only to appreciate the museum in its entirety, but to select the case in which he will probably find some particular object of his search.

The centre of the floor space has along its length a number of flat-topped glass cases in which are displayed surgical instruments

of all kinds, but in particular those intended for military service. Various miscellaneous objects are also on exhibit here. The series of microscopes is one of much interest as showing the evolution of the instrument from its earliest days. Models of military hospitals, hospital trains and steamboats bring to mind the busy days of the Civil War; while near by are tube cultures of the various bacteria the study of which has had such a wonderful influence on the progress of surgery since those times of active service. A fine series of urinary calculi, models of the common and harmless and of the poisonous mushrooms, and life-size models of the anatomy of the horse are prominent among the objects displayed, as are also a collection of medical medals and a series of delicate longitudinal and antero-posterior sections of the human embryo prepared by Dr. Wm. M. Gray, the microscopist of the museum.

It is, however, in the display cases projecting from the side walls that the systematic methods of the museum are seen to the best advantage. In illustrating any part or organ of the human body its normal development is shown first and then the abnormal deviations that are occasionally found, with specimens from the domain of comparative anatomy that throw light on the deviations. These are followed by illustrations of its anatomy and physiology, and lastly of the diseases and injuries to which it is specially subject. The cases are numbered in arithmetical sequence. Case No. 1 and those immediately following it contain specimens illustrative of the organism as a whole, beginning with the formation of the ovule in the ovary, following its progress to the formation of the embryo in the uterus, and thereafter showing the gradual development of the latter, with many side lights on the subject from comparative embryology. The abnormal developments are then shown, such as hydrocephalus, spina bifida, extroversion of organs and various monstrosities. Next come the anatomy and physiology of the perfected system, and then illustrations of general morbid conditions such as tuberculosis, cancer, septicemia, syphilis, alcoholism, fevers, etc., and lastly general injuries, as from crushing, explosions, and exposure to heat and cold. The various anatomic regions and organs are then taken up, one after the other, and each has its medical connections illustrated by specimens showing its development, abnormalities, anatomy, physiology, morbid conditions and injuries.

In the gallery is a series of show cases, like those below, in

which are exhibited the missiles, weapons, fractures, excisions, amputations, and other specimens of the war. In fact, the museum of the old Ford's Theatre building may here be recognized, while that on the floor of the hall is relatively a new institution. The gallery contains also many specimens of comparative anatomy, a magnificent collection of skeletons and crania, some frozen sections of the brain and dissections of other parts of the body preserved in alcohol, and many beautiful wax models of diseases of the skin.

Reprints and Translations.

THE SYSTEM OF ARMY TRAINING OF GENERAL DRAGOMIROW OF THE RUSSIAN ARMY.

By Major TONNOCHY, 4th Sikhs.

(*From the Journal of the United Service Institution of India.*)

THE Russian soldier has a proverb, "It is jollier to die in company and little mother Russia has sons enough," on which one Drigalski has remarked "this feeling, namely, the indifference to danger arising from a certain want of intelligence, though accompanied by undoubted heroism, will be probably in the future as it has been in the past, the strong point of the Russian infantry."

This want of initiative yet possession of quiet, uncomplaining courage in the discharge of duty, must be remembered when considering the system of training adopted by a Russian. National characteristics show up nowhere so much as in war, and a leader is wise who remembers them.

Dragomirow commanded the 14th Russian Division which led the way at the passage of the Danube in the Russo-Turkish War, and distinguished himself at the Shipka Pass. He now commands the military district of Kieff, and, according to Captain von Mach of the 4th Magdeburg Infantry Regiment, whose paper in the *Neue Militärische Blätter* for October, 1895, I wish here to bring to notice and discuss, he would in case of war be appointed to take chief command against Austria, if not selected as Chief of the Staff to the whole Russian army. In peace the General has under his orders 4 army corps, 5 cavalry divisions, 1 brigade of rifles, and one of reserve infantry. It is evident, therefore, that his views must have great weight and influence. He is the author of several military works, one of which is the basis of Captain von Mach's article.

From this article, which I think of great interest as giving not only a Russian, but a Prussian, view of the subject, I must quote largely. "Dragomirow's system of training," says the writer, "is based on that of the Great Suwarow. 'Suwarow' taught his troops in such a way that they came on nothing new in the day of battle, and attacked with cold steel with the same earnestness they had shown at manœuvres. The youngest soldier of those falling within the sphere of his influence knew war-craft both practically and theoretically better than it is known at present in any European army, even the most highly trained.

"When he had clearly recognized that, for victory, it is needful to strengthen the soldier intellectually, morally and physically, Suwarow, as a direct consequence, brought his system of education in absolute harmony

with these objects. The development of the power of apprehension, and especially of resoluteness of character; the blunting of the instinct of self-preservation so far as that is to be attained in a living being; the strengthening of the intelligence of the lowest soldier in the principles of war-craft; that was Suwarow's system in all its simple and comprehensible sublimity. For his soldier there was nothing unexpected in the fight, since he had already in peace-time been tested in the most difficult impressions that battle was able to produce. When, however, a man is so educated that nothing can astonish and upset him, when he knows in addition what he has to do in his own humble sphere of activity, then he cannot be conquered, then he must conquer."

In his work Dragomirow separates education from training. He attributes great value to education, for the success of the training depends on the education of the soldier, that is, in the degree in which he is penetrated with a consciousness of doing his duty.

According to Dragomirow we must watch and shape the heart and head of the soldier before all things.

"The time," writes Dragomirow, "when it was believed possible to influence the heart and head, through the arms and legs, is forever past, and it is so because it was false to suppose it, as has been proved in a whole list of campaigns. There are indeed still people who think so, as is ever usual in the transition from old to new ideas; but they are gradually yielding their convictions and are compelled day by day, step by step, to accept as true, much which they formerly held as unbearable heresy.

"It is not to be disputed," he continues, "that something does enter the heart and the head through the arms and legs (Dragomirow means of course the power of habit); but this something in the first place is not effectual for a man who is called to sacrifice his life for his country; in the second place, it has frequently quite unexpected, quite the opposite of the intended, results." Dragomirow probably means that a soldier chiefly drilled and not sufficiently educated for war, does the thing he has practiced by habit, but in the presence of unforeseen demands on him he is quite at a loss.

"We should therefore before all things seek to implant in him a soldier's feeling of duty, that is to say, to develop honorably his understanding, to make his heart stout, and the rest comes of itself."

He does not therefore at all consider as useless the teaching to fight, shoot, and march, etc., but simply means "that one is able to instruct at least ten times easier a man penetrated with a feeling of duty and of an honorable mind than one altogether or partially wanting these characteristics," and there he is doubtless quite right.

"We must not forget" says Dragomirow, in the same work, "that it is our vocation to destroy and to be destroyed, and we must not shut our eyes to it."

Later he continues:

"Thus the soldier must be so educated that he is not afraid to be destroyed but so that at the same time this destruction costs the enemy dear. For this, not only self-denial, but intellect too, is required: in war

self-denial is strengthened chiefly by education, while intellect is developed in a military point of view, chiefly by training."

Dragomirow far from disputing the intimate relation that exists between education and training, admits "that it goes without saying that by a rational management of each, they mutually support one another, because a man educated to sincere obedience can be more easily instructed in all sorts of exercises such as bayonet fighting, firing and manœuvring; moreover while we exercise him in any of his duties we strengthen him in obedience, and we strengthen him all the more when our demands are practical, that is the more they are of such a kind that it is clear for what purpose they are required. For example, (1) I cause a man to take aim once, twice, twenty times in succession. (2) I make one and the same motion of the Manual Exercise just so, twenty times in succession. In the first case the stupidest soldier understands the object, while in the second (it is the idea of Dragomirow a highly cultivated man) the cleverest does not comprehend why it is necessary. The latter we can cause to become a punishment; but then we must take care that every one takes in that it is a punishment.

"This practical spirit in our demands I too hold," says von Mach, "to be of uncommon importance; for every man obeys the more readily the more evident to him is the reasonableness and needfulness of the thing commanded. Now the soldier must certainly obey without testing the quality of the order, that is his views on this point must have no influence on his obedience, but we shall come the nearer to this ideal the more deeply we confirm the soldier, through practice, in the conviction that all that is ordered is good and sensible. The confidence so won will then make him equally zealous in carrying out orders whose object he does not rightly perceive.

"The requirement that only what is reasonable be ordered, appears so self-evident that many would consider its accentuation superfluous; in reality, however, it is oftener disregarded than one would suppose, and that too by those who ought to know better. For instance, such a long standing at 'attention' is often required of the soldier that he is directly betrayed into disobedience, that is into secretly standing at ease."

Von Mach then speaks of the injury to discipline of long marches at attention, of long periods in the kneeling position, of refusing the use of water-bottles on hot field days and so forth, which faults with our "march at ease" and "rest" position, etc., are not common faults with us I hope. In such cases, as he says, it is better to give the order than to wink at the men doing it themselves, the latter being hurtful while the former is distinctly beneficial to discipline. "If we spare people at the proper moment then we can ask tenfold of them when necessary."

He then says that Dragomirow lays great stress on the fulfilment by the soldier of interior and guard duties, and considers he should be prepared by instruction for all contingencies, examples being quoted for his enlightenment, and a properly regulated system of punishment maintained, by which the instruction is to be enforced. Von Mach next comes to two very interesting matters dealt with by Dragomirow. He says:

"Before explaining exactly Dragomirow's method of training, I might

mention two sorts of exercises of his which should well serve as education for the soldier, inasmuch as they accustom him to the dangers of fire-fighting and the close struggle, as far as is possible in peace.

"These are the 'Accustoming to Firing' and the 'Through Attacks,' the former a device of Dragomirow's, the latter derived from Suwarow. The 'Accustoming to Firing' is to be used only by the special order of higher authorities, and is not yet introduced into the whole Russian army.

The individual man is to be accustomed to infantry fire, by being placed straight in front of a target against which a marksman at 50 paces fires single shots placed to the right and left of the soldier standing in front of the target. The exercise is to be so arranged as to have the character of a pleasure, as Dragomirow literally expresses it, and not that of a forced duty. [One can imagine a rather sickly smile on the soldier's face till he got accustomed to it.]

The troops are to be accustomed to artillery fire by being exercised in the space between the targets and artillery firing with shell, so that the shots fly over the troops at a dangerous (?) height.

Batteries of artillery in the same way are to be placed opposite each other between two target positions, and then each side is to fire over the other at the targets beyond.

Finally, firing practices are to take place of mixed detachments, 1 battalion, 1 squadron, 1 to 2 batteries, against target positions, approaching them in an actual service way, under a settled general idea. In this case too the troops are to be practised in having the artillery shooting over them, and the rearward parties of infantry shooting past them. These last practises are to be introduced officially into the whole Russian army.

The "Through Attacks" are to accustom a man to the impressions made by attacking infantry and cavalry, as well as cavalry to that of the proximity of attacked infantry and artillery.

Dragomirow wishes to see these exercises of Suwarow's practised not only after every manœuvre, by which he understands every battle-exercise, but also on the drill ground, and these exercises are also to be introduced officially into the whole Russian army.

In the attack of infantry against infantry they are to be placed opposite each other in close order, in line and column, at a distance of 400 paces, and one side thereafter carries out the attack as follows :

Swift advance to 200 to 250 paces, firing volleys. Then a further advance from 100 paces on with beat of drum, from 50 on with arms at the charge. At 20 to 30 paces a hurrah is given, and they pass with weapons uplifted through the party opposite them. This party, which has fired volleys till the attackers had advanced to within 50 yards, rushes to meet them in the same way with hurrahs. As they meet, the quickest double is required. After passing through them the former attackers continue the movement for 400 paces, in order then to place themselves so as to receive the attack of the former defenders.

The attack of cavalry through infantry (it is noteworthy that Dragomirow knows it also the reverse way) takes place at the same distance. In the former case the infantry files take up at first an interval of 5 paces and the

cavalry carries out the movement at a trot. Later the interval between files is to be closed to 3 paces and the attack in half zugs, finally at full speed to ensue. The infantry fires therewith a volley at 200 paces. [Forbes Mitchell in his "Reminiscences of the Great Mutiny" relates how the 9th Lancers charged the square of the mutinied 41st N. I. "The Lancers charged well up to within about 30 yards when the horses turned off right and left from the solid square. * * * The squadrons were brought round again, and we saw Sergeant-Major May, who was mounted on a powerful, untrained horse, dash on the square and leap right into it, followed by the squadron on that side. * * * The horses were thus drilled to turn off and gallop clear of the squares instead of charging home right through the infantry. When it came to actual war, the horses * * naturally acted as on a field day. * * * I am convinced that this is the reason that the untrained remount ridden by Sergeant-Major May charged into the square of the 41st and broke it, while the well drilled horses galloped round its flanks in spite of their riders."]

"In the attacks against artillery, which are also to be specially practised, the infantry and cavalry employ the extended order, the closed portions in rear have to turn towards the covering party [escort], which must meet the attacker in advance of the battery-positions, naturally in an oblique direction."

I consider the "Through Attacks" as very useful and worthy of introduction amongst us. One must agree with what Dragomirow says with reference to them. "Mischances are certainly possible. They can occur also in firing, in fighting, and in gymnastics, but in the first place they will occur seldom, in the second they will be a hundredfold out-weighed by the fact that thus taught, our infantry and cavalry will not be taken by surprise by anything unexpected in battle."

With reference to the exercises for "Accustoming to Firing," my readers will doubtless be of my opinion that they are indeed well adapted to the purpose, but that their employment is not to be expected in any other state than Russia.

From all that I have mentioned heretofore it appears that Dragomirow places greater value on education than on drill. If there exist any doubt about his views in this respect, it is only necessary to read his treatise, "Training and Education," which appeared in Helwing in 1892,—translated also by Lieutenant von Tettan. He says there, referring to the matter in question, that many people formerly overrated the importance of the drill ground in comparison with the manœuvre field. "The point is therefore What and How one must learn on the drill ground? Suwarow had learnt on the drill ground and the drillers also have learnt there; the difference in the result, however, has been most notably demonstrated. The pedagogue's axiom has long been familiar. 'It is not a question of the What but of the How.' It is interesting to compare with this the views which Drigalski, the well known authority on, and describer of, the Russian army, obtained by his visits to the Russian summer camp of exercise.

"The position of the Russian soldier does not quite correspond with the rules that are current with us. He throws his weight in standing and

marching less on the ball than on the heel of the foot, so that according to our æsthetic ideas his stomach is too far forward. Something of the same sort is the case in the position for shooting in which the Russian does not bend so far forward as we do. The Russian calls his position an unconstrained one, and laughs at the drawnback knee and upper part of the body curved like a wheel of our soldiers. [This was in 1885. The German regulations forbid this in the drill of 1889.—Tr.] The motions of the Manual Exercise are perhaps not quite so exact as ours, and one sees individual men doing them late without being reproved for it. One everywhere hears officers answer if one makes a remark on the subject: "We simply practise what would be actually required in war: more is unnecessary and waste of time." The consciousness that to reach our goal now in peace, there is necessary a certain *plus* of performance, or if you will, an excess of it with the intention of its being a means of schooling, or simply as gymnastics, does not seem to be found in Russia. In contrast with the appearance of extra-strict training in detail in the time of the Czar Nicholas (at the camp of Kalish, *e. g.*, the Russian considered the position, march, and motions of the Prussian troops capable of much improvement) one gets the impression amongst other things of a comfortable let well-alone. It is also observable especially in the march, although they march much more in step [*i. e.*, at attention] than we do. The march of the Russian is comfortable and looks quicker than ours, but as the steps are shorter they get over rather less than more ground in the same time than we do. Which is the most tiring at a stretch I leave undetermined, but in any case the marching performances of the Russian soldier are beyond question. The long step is, so it is said, absolutely banished from the programme of training, and is looked upon as a useless refinement. The march and keeping step is practised by a number of soldiers being made to march in file round a beaten drum in a circle, till the quick step is exact; less depends on the position. At first one sees the legs struggling in and out; gradually, however, the thing gets regulated. Later on marching is done in ranks, sections, and whole companies."

After mentioning an occasion on which Drigalski saw the long steps used for punishment, he continues. "However that may be, I have seen troops, trained in this, I might say, more empirical method, whose march must strike even Prussian eyes as military and even elegant I am here thinking specially of some rifle battalions and the Finnish Life-Guard regiment in Krasnoe-Selo. Specially in this excellently trained and evenly recruited regiment at a march past in companies I saw such a self conscious, bold bearing, such even, free, stepping out, such a general and unconstrained dressing, that I was obliged to express repeatedly my loud admiration."

Dragomirow's ideas on the necessity of the sole sway of field service considerations appear to be of weight also in the St. Petersburg military district.

With us, on the contrary, adherence to the ancient Prussian exercise drills is looked upon as one of the surest means for the production of a strict discipline, and according to my idea the results obtained would be the better, the more we are accustomed to demand the greatest strictness

in the fight, and indeed now in peace time, and this accords too with the spirit of our regulations.

I pass to what Dragomirow says about training, now that we have considered his views on education. In doing so it appears to the point to explain Dragomirow's method of teaching. He lays down, like Suwarow, that the soldier must learn to understand everything that he does, not only the elementary handling of troops, but also the tactical principles which determine their application.

The teaching of the soldier is to precede every practice and be in reference to the object of it, because, as is again explained, a man obeys the more willingly the more the necessity of what is required is clear to him The soldier is to understand too every manœuvre, that is every battle-exercise, and is therefore to have impressed on him, by their being pointed out, the actual tactical principles governing the application of the schemes, and the mutual action of the different arms. Take the coöperation of infantry with artillery, for instance. Dragomirow would bring it to the man's understanding thus:—"Next the two arms are to mutually learn to know each other. The infantry for this wheels off by zugs, the guns pass into the space between, and in unconstrained intercourse the artilleryman shows the infantryman his horses, his guns, and their detachments. The infantryman strokes the horses, tries to load the guns, and then as a return explains the mechanism of his weapon. After an instruction on the principles of the mutual support of the two arms, the exercise begins, at which as a rule one regiment and one battery will work together. The regiment deploys for the fight, one gun goes into the firing line. The men of the latter have been before instructed to make room for it immediately, and to protect it by taking up a position in front and on the flank and must now of themselves act in accordance therewith. Another gun later marks a battery driving up on the flank. The nearest infantry company, for instance, out of the battalion reserve (the Russians so call all companies not in the first line) must thereupon without orders take up a position on the far side on its flank and front, but send word to the battalion commander.

A third gun drives up on the other wing but with another front than the infantry, the next company concerned must take up accordingly another position to cover it. Then if the artillery goes forward, the firing line must see that it does not remain behind. Now the order is given to the regiment "Retire," while the artillery is ordered to remain halted. Now the companies near the artillery must remain halted to cover it, in neglect of the general order to retire. Finally an attack on the battery, which must be met by its escort, finishes this elementary kind of exercise. Its duration is fixed by Dragomirow at from two to three hours, and he thinks that in consequence of such instruction no fault will be committed by infantry so directed, in reference to artillery.

This method, which is also proposed for the mutual working of the other arms, has the advantage of great plainness, and offers, as primary teaching for the fight with all arms, all advantages which in teaching every resolving of a subject into its elements carries with it.

For the rest Dragomirow requires first, individual-training. He restricts

himself in this to a few remarks, which again accentuate in everything adaptation to warlike conditions. In gymnastics he recommends only the applied exercises, and gives as illustrating the best exercise-ground, a fort of strong profile with all possible obstacles.

The instruction in the use of the weapon should not according to Dragomirow begin with the Manual Exercise but with preparations for firing and bayonet practice. On bayonet practice he places not only a moral, but a great practical value. He is in fact, in all earnestness, even to-day, a champion of the Suwarow view of bullet and bayonet, since he says in his memo to soldiers: "Save up your bullet three days, yes, even during the whole campaign if you have no use for it, shoot seldom, but shoot sure." "With the bayonet thrust hard: the bullet misses, the bayonet does not; the bullet is a fool, but the bayonet is a stout fellow." In an order to his troops in 1892 he forbids both lying down and kneeling in the firing line in the attack. According to his view "such an advance does not increase the losses but rather lessens them since hitting a single man is no easy matter in peace, in battle it is entirely accidental; the advance, however, will be far more energetic and unanimous, since each one will recognize that he will not find cover from the enemy's fire until he arrives at the enemy himself."

This order is contrary to the Russian regulations, which recognize as ours do an advance by rushes with lying down, and prescribes it for the attack from 800 on to 200 paces in open ground; from which it appears that Dragomirow can give himself leave in such matters. For the rest, even amongst us, the Dragomirow attack with the firing of skirmishers rushing forward, known briefly as the "Russian," has its adherents. But it makes too large demands on human nature and must therefore fail. With us it has been thoroughly tested on the range in order to bring palpably under the eyes of its defenders their error and since then it has been rightly done away with.

Dragomirow, however, does not lose sight of the possibility that his attack may be impracticable. The firer is still to be trained therefore, as before, to the use of his weapon while taking advantage of cover. Special exercises are further to be done in order to represent the carrying forward by waves of the firing line, when brought to a stand by casualties (in peace done by signal) by the uninterrupted advance of remaining parties. On the skilful leading of these parties with all cover utilized, Dragomirow lays the highest value; but in the actual battle exercises he appears to wish to strengthen above all the offensive spirit, to the detriment of the fire-struggle and taking of cover.

I believe that this trait of the Dragomirow mode of fighting, suited though it is to the Russian national character, would have very dubious results against a disciplined and good shooting antagonist.

Even in 1877 the defective fire-preparation of the Russians, according to Kuropatkin, was the chief fault in their attacks, undertaken with acknowledged bravery. By adherence to Dragomirow's directions in this respect, like experiences will be met with in the next war, which if they are our opponents, can only be agreeable to us."

This is true. But there is surely truth on both sides. It is impossible to suppose an officer of Dragomirow's experience does not know that men advancing against a hail of bullets will take cover. But it is almost an axiom in training to train to the impossible in peace, in order to attain the possible in war. His aim then is to imbue men with the idea that when advancing to the attack it is not right to remain under cover. It has been, is now, and I believe ever will be, the glory of the British soldier that he can be trusted to cover. He is only too keen to leave it. But it is not so with all soldiers; and ours is a heterogenous army.

As regards the value Dragomirow places on the bayonet, surely there is something in it. "It commonly happens in modern war," says Kinglake, "that the dominion of one body of infantry over another is not found to depend at the last upon the physical strength of man or the quality of his weapons, but rather upon faith, or in other words, upon sense of power." Now this sense of power, this faith in himself and his fellows, cannot coexist in the soldier with a belief in driving out his enemy at long range, it must imply a determination to come to hand-grips with him, and to clear him out. And if the defender has the same faith it must come to a deadly hand to hand struggle as in the case to which Kinglake alludes. As Von Meckel (Elemente der Taktik) has well said "The Fire-fight has assumed, in the modern infantry combat, the predominant rôle. Its destructive power furnishes in the most bloody way every premature use of cold steel. —the issue of the fire-fight has become in the infantry struggle the primary basis of every decision. *But now as ever, the Laurel of Victory waves before the point of the bayonet.*" The italics are his. But to quote again from Von Mach's most interesting paper.

The "practical" training of the company for battle forms, with Dragomirow, the basis of the entire training of infantry. "If the companies are good the battalions will also be good."

It depends chiefly on this, "that each company in the unity of the battalion should act as part of a harmonious whole; the companies must before all in all situations fix their thoughts on mutual support."

"Often," says he, "the principles of support require that the battalion should form one body, often, in order to satisfy the same principle, it is better to split up the battalion into its organic constituents, the companies; that is to give to the latter a corresponding portion of independence, hence the battle formation in companies of the battalion."

He then proceeds to give some details of Russian formations which I omit. It appears from them that the Russians have formations for battalion drill more like ours than those of the Germans. They have of course only four companies to the battalion. They call their firing line a "chain" and each group of four men a "link." "The behavior of the companies in this formation (battalion in column) Dragomirow compares strikingly with that of the soldier in the "chain link."

"This is the smallest unit of the firing line and consists of four men. In the chain link." says he, "perhaps one lies down, another stands, the third sits, the fourth kneels; they do not fire at the same time, but they must strive to reach the goal prescribed for the chain, and for that purpose must

support each other perhaps, the one by shooting, the other by bayonetting." Just so must the companies of the battalion act, "the formation, the use of their weapons, etc., may be different, but the end must unite all of them." The same principles hold for larger bodies.

For the individual Dragomirow requires next the "Front-Training," that is our parade exercise. In it no general idea is to be laid down, but the drill formations are to be brought to the clearest possible representation. He rightly considers it very important to keep the attention fixed, and all possible small means are recommended for it, such as we also use, namely, calling out of intended portions to carry out different unforeseen words of command, avoidance of a regular order in the words of command, etc.

After explaining the "Front-Training" Dragomirow comes to his "Applied Regulations." He understands by that developments from all conceivable formations against an enemy, who is to be engaged in all possible directions, distances, and combinations of arms.

In accordance with the rule that every soldier is to understand his manœuvre before a new engagement, the direction from which the enemy is to be expected is always to be communicated to him, or the enemy's position carefully pointed out, all in a loud and distinct voice.

He then gives a number of practices, supposing the enemy in eight different directions and recommends one's making up one's mind as to What I am to do if my opponent appears very near, near, at middle and long distance, if it is infantry, artillery, or cavalry?

Dragomirow gives his solutions for a large number of such examples. He expressly states, however, that he in nowise declares that he has found the best solutions, but simply gives his own for free consideration.

This way of preparing himself and the troops for war situations is indeed very instructive, and in fact we use it. Dragomirow's systematic management of it is very decidely to be recommended for the teaching of both leader and troops.

Von Mach here quotes some examples for the company in column of sections, first of infantry attacked by cavalry from the rear, then from half left rear. In the former case they turn about and form a sort of echelon from the centre, the two centre sections closing on each other and firing four-deep volleys. In the latter case, the column turns three-quarters left about and wheels into half echelon to the left. The former is at 1500 paces, the latter at 700. There seems nothing specially new about this. Of cavalry attacks in general, Dragomirow says "In attacks at 300 paces there is no time for volleys, in those at 100 paces none for altering the front. In this case all that can be done is to make a turn towards the enemy and charge bayonets." Then follow examples of infantry against infantry. In these also there is nothing calling for much remark except that he precedes every formation by a turn towards the enemy. Of this Von Mach justly remarks "I consider it a very practical thing, the introduction, before the beginning of each rapid formation for fight of the company, of the turn towards the enemy, and as very important the observation of the enemy's movements as they arise in the distance, which requires under certain cir-

cumstances the willing renunciation of both forming and firing. In a very practical way Dragomirow emphasizes the necessity when resisting cavalry of leaving out useless words of command, such as frequently pointing out the mark where every one sees it, etc."

After touching slightly on the "Applied Regulations" for battalions and regiments, von Mach comes to Dragomirow's manœuvres, by which he means battle-exercises, and notes the following points:

1.—"In the preliminary exercises the problems, *e. g.*, for battalion-manœuvre are to be made known a week beforehand and the leader is allowed to inspect the country first, in order to be able to pass from easier to more difficult problems, namely to such as ours.

2.—Attacking and defending detachments are according to Dragomirow to be of the same strength, for "if we suppose that it is in accordance with the nature of things that the attacker must necessarily be the stronger, as the German manœuvrers assume, then we sin against reality, for attacks are made and victory won not only with equal but often with smaller forces; secondly, we see in the manœuvres not a handling of them for instruction but a game to be won; thirdly, the conviction becomes inrooted that attack is possible only with superior forces." Dragomirow does away therefore with the umpire's decision on the issue of the fight. He thinks they make one prudent and cleverer in manœuvring but that they injure the moral qualities on which victory depends, namely, "unshakable daring, swiftness of decision, and stubbornness." Besides he considers the custom as anything but useful of listening "disinterestedly and calmly to utterances so degrading to every soldier, such as "they are beaten, their attack has failed," and every battle exercise is therefore to end with the "Through Attacks" already mentioned, and "neither victor nor vanquished is to be pointed out by the umpire."

"This is a point," continues von Mach, "decidedly worth considering; for the custom of criticising, chiefly on the score of strength in numbers, a leader's resolve, when making or accepting a decision, might with many leaders have hurtful consequences. If the last reserve is used up and unless we are, somewhat exceptionally, still in the position to clear out without considerable loss, then the resolve under the unfavorable circumstances to force victory, is almost always the correct one. The steadfast, unshakable determination of the leader to conquer is still often able to neutralize unfavorable chances and bring about a good ending. At the very worst those troops serve their country better who even sacrifice themselves consciously by pressing an attitude of decision in a combat once begun and carried through to decisive distance than do those who commence a retreat, which in war can end only in utter annihilation."

Now has all this any bearing on the army in India? Whatever we may think of Dragomirow's way of carrying out his system, that such a system is sound can hardly be doubted. Do we find here a careful war-education and war-training of the soldier advancing from the individual to large bodies of troops? First as regards education, we have an army consisting of many races. Is it not the fact that we are trying to train these men's hearts and heads exclusively through their arms and legs, that is teaching

them drill and trusting to their being found not wanting in war? Do we not too often hear comparisons of one race as against another? *Esprit de corps* is of course an excellent thing, but surely we have no call to go in for *esprit de race*, if I may so call it. On the contrary, is it not our duty so to train the raw material of those, good or bad, the Government puts in our hands that they shall be ready for war through zeal for duty, a spirit of resolute self-control, and affection for those set over them? I do not believe it is impossible to instill these feelings into any of the races we have to do with. At any rate is it not absolutely necessary that we try? If it is necessary in Russia, it is ten times so in India.

To me this question seems of immense importance. We are saying, such and such a race were good soldiers once, but, having become unused to war, are so no longer, and we must not enlist them. How long can we go on like this? All races gradually become unused to war. It is almost as true of Germans or Russians as of natives of India. Surely it is then our duty to keep before their eyes so vivid an impression of war that nothing in it shall be surprising to them. At present we can pick and choose between this and that class, this and that caste, and are so far right, no doubt, but would this arrangement alone stand the strain of a great war?

Again, have we enough of applied drill and tactical training? Camps of exercise are excellent, no doubt, but do the companies and regiments attending them come so trained as to be able fully to profit by them?

The drill books lay down now no normal formations for war. The fact is the details of minor tactics at present are unsettled and have been so for some time past. Troops can therefore only be efficiently trained by such action as Dragomirow's, that is, by officers of reading and experience taking up the matter and showing possible combinations in the varying circumstances of war.

Again, is every manœuvre so carefully explained beforehand that say, at least every commissioned officer understands exactly what is about to be done? It is not my experience. Much less that the regiment as a body has a fair idea of it.

Von Mach brings his paper to a close in the following words:

"To conclude, I give a sample of how Dragomirow invites his officers to study. "However much has been said," he says with reference to his directions; "it is still insufficient. Even the fullest and most detailed instructions leave gaps and something unexpressed; therefore we must not confine ourselves to the regulations and instructions, but we must read, read, and read; for choice, the detailed works on military history and performances of those who have not only been engaged in war themselves, but have written of it.

"Specially make yourselves acquainted with the work of that ever-memorable man, our great Suwarow. Only if you are penetrated with his spirit will you acquire the art of speaking with the soldier simply, intelligibly and from heart to heart.

"But whatever you read take nothing from any one as granted. Never quiet yourself with the thought, so and so says so, therefore it is true. But put to yourself this question: Why does he so speak? When you have

found out this "why" or the author has given it to you with his arguments, then you can rest satisfied, and then his idea becomes yours, for you have yourself travelled the same road by which the author arrived at it. If however you have not discovered the "why," then do not believe what the author says, even if it was Napoleon himself."

"I believe we can declare ourself in harmony with these words," concludes von Mach, "whatever we may think of Dragomirow's ideas in details."

OUR ART OF WAR AS "MADE IN GERMANY."

By T. MILLER MAGUIRE, LL.D., Inns of Court Rifle Volunteers.

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II.

THE more I reflect, the more I am amazed and irritated at the extraordinary perversity of the pedantry which has substituted one campaign of six months' duration of one foreign race, not only for the general history of mankind, but for the brilliant records of our own people during the centuries of imperial development which have elapsed since the glorious days of great Elizabeth.

Since my last article, I have been frequently asked whether it be true that students for Sandhurst and Woolwich are compelled to learn either French or German literature and philology, while they are prevented from learning anything about the literature of their native land. My answer consisted in showing the curriculum and the papers as printed by authority. Will it be believed that thirty-five out of forty successful Woolwich cadets in June, 1895, and more than half of the Sandhurst infantry cadets in November, 1895, did not know a word of English history, and eschewed this most necessary subject altogether? Contrast this state of things with the programmes for St. Cyr, the German cadet schools, or West Point, and no one will wonder at the indignant words of Lord Wolseley about the lack of patriotic feeling among our classes as well as our masses. People who have been brought up in utter ignorance of the conditions of their nation's prosperity, and of the past records and future responsibilities of their race, will not be in a state of excited enthusiasm to become officers of Volunteers when golf, or tennis, or billiards, or any other fashionable recreation is offered as an alternative. Lack of knowledge, and lack of enthusiastic interest in the national well-being, and not lack of money, causes the deficiency of volunteer officers, of which we hear so much. From the point of view of training our young men for citizenship, or nurturing their military spirit, the schoolmaster, who is so very much "abroad" nowadays, had much better stay at home. And, as I said in my last article, if by any chance, as for the Staff College, military history is included in an educational scheme, it is some utterly dull and dreary narrative of matters in which Englishmen can scarcely feel more than a feeble interest, always something relating to

Germany, nothing concerning our own empire of 400,000,000 subjects, and with stations in every sea.

I assert, without the least hesitation, that a study of Mr. Curzon's book on "Far Eastern Questions," and Chesney's "Indian Polity," would pay every Briton, civil and military, far better in every way than the writings of Boguslawski, and Du Vernois, and the official account of the Franco-German War all put together. By the way, according to Hoenig, the last-mentioned work appears to have been a grossly misleading, although monumental, masterpiece of dullness; why any Briton was ever asked to learn it in minute detail will ever remain a mystery. I have frequently spent hours over the battle of St. Quentin with students who never learned anything about the campaign of Waterloo. I have worked at the attack of Busserel with officers who had never heard about the battle of Laswari. I have been obliged to point out the importance of Bitsche and Lutzenstein to grown men to whom Plassey and Assaye were empty sounds. We have been too busy with the marches of Manteuffel through the Côte d'Or, and of Stülpnagel to Guéla-Hart, and of von Przychowski to Mulsanne, 7 P. M., January 12th, 1871, to spare even one hour for the operations of Pollock and Roberts in Afghanistan; we have been urged to devote the utmost attention to von Bredow; for my own part, I always believed that Lake's cavalry in India, the Union Brigade at Waterloo, and Sir Drury Lowe's cavalry in Egypt, were at least as important to us as every German swordsman who charged a Gaul since the days of Frederick. Touchstone was proud of Audrey, who, although very ungainly, was his own. We seem to be ashamed of our own, while we fawn with adulation on each of our neighbors as a turn of the wheel of fortune puts him for awhile in a position of temporary military preëminence. We even copy his clothes, and imitate the caprice of his tailors. As long as France was the pet of the "Great God of War," we wore a képi; the Germans invested Paris, and our soldiers wore helmets; if the Turks had driven the Russians across the Danube. after their early successes at Plevna, fez caps and turbans would be our "only wear."

I venture to make another statement which will seem far behind the age. I am quite sure that, as a means of education for Britons, the careful study of Alison's "History of Europe," or some selected volumes thereof, would be far more beneficial than any further narratives of or criticisms on, campaigns of the Franco-German War. But our Anglo-Teutonic leaders would declare that all this is ancient history; that the art of war has been so changed by railways, telegraphs, etc., that it is a waste of time to study any campaign in which these new instruments were not employed. How comes it, then, that the Napoleonic campaigns, of which Alison's is as good as any other history, and far more interesting than most histories, are carefully studied by their German masters? Again, what very wonderful information is contained in any of the German treatises in vogue about railways? Moreover, what race first made most use, on a very grand scale, of steam for locomotion? I thought it was the British rather than the German. Why should not our railway experts draw up just as good a scheme for our soldiers as any German? Is not the management of junctions, like Rugby or

Clapham, equal to any German enterprise? I believe Clarke's treatises on "Marches and the Use of Railways," to be every bit as instructive as those of Bronsart von Schellendorf. If the latter gentleman had written exactly the same book, word for word, and signed himself Smith-Jones, or MacDonald O'Donnell, no one would have read a page of it, and our Germanic faddists would have forthwith hurried off to translate some other product of the Teutonic army brain, however inapplicable to our ideas, our habits, our resources or our responsibilities.

We left Prince Kraft zu Hohenlohe Ingelfingen rapt in hero worship of his authorities, Clausewitz, Blume and Bronsart, and, inspired by them to write his "Letters on Strategy"; and we left most modern British lecturers lost in admiration of Prince Kraft's Letters. Yet, strange to say, this oracle's first volume, for the most part, deals with what they would call ancient history. He treats of the Jena campaign, 1806, and of the Magenta campaign, 1859. I seldom read less interesting descriptions of any military operations, and I would strongly recommend a student to take up Vial and read the same campaigns in his pages. He will learn all that he wants to know in far clearer language, in half the time, in a coherent, connected narrative, without being constantly checked by supposititious arguments with an imaginary correspondent, and dreamy hypotheses, and tiring generalizations that lead to nothing. Vial, with no pretensions or circumlocutions, tells a plain unvarnished tale that any one can understand, illustrated in a manner that no one can misapprehend. In English, a very useful British work is Colonel Malleson's comparison between 1806 and 1870; it contains at least as much wisdom as anything of Prince Kraft's.

But of course 1806 and 1859 are merely preliminaries, and accordingly one-third of the first volume is devoted to the marvels of the war of 1870 up to August 18th. Well, if we have not learned all that we need know of the mobilization of the Germans at the end of July and beginning of August, and of the lessons of Spicheren, and Woerth, and Colombey, and Résonville, and Gravelotte, by this time we must have hardened our hearts against military revelation. If any one wants to hear all this tedious tale again I would refer him, not to Prince Kraft, who is not up-to-date, but to Hoenig, and especially to the latter's remarks on how the 38th Brigade, X Corps, was managed at Mars-la-Tour. Personally I was very glad indeed when I became convinced that it was wretchedly handled; after all we had heard of the gifted German leaders, we were proud to be informed that a Crawford, a Picton, or even Outram or Havelock, could not have done much worse than the veteran and illustrious general Von Schwartz Koppen.

We now come to Volume II. of the "Letters on Strategy." It is neither more nor less than a series of disquisitions on the marches of MacMahon's troops, August 23d to September 1st, 1870, and the wheel of the Germans which led to the capitulation of Sedan. I venture to suggest that a British officer, who has had no previous education in military history, could not make a more useless waste of his time, than in this elaborate study of the work of two German armies for twelve days. "Up-to-date" strategists, who want to know all about railways and telegraphs, and so forth, will find very few pages in the whole work relating to their hobbies. I cannot see

anything more instructive in all this tiresome iteration than in Napier's account of Marmont's splendid manœuvres against Wellington in 1812; and Napier was a historian of the first order, as well as a soldier, and not a mere military pedant. Prince Kraft himself admits that MacMahon had not the ghost of a chance from start to finish, and that he was pre-ordained to ruin, whether he passed the Meuse at Dun and Stenay, or not, whereas Wellington was neither predestined to defeat nor defeated, and yet Marmont very nearly proved too much for him in spite of all his caution. MacMahon's army was not much more than half that of the German 3d and 4th armies, not to speak of Corps II. and III.; his artillery was inferior, his cavalry was inferior, his organization was inferior, his system of supply was most defective from the start, he did not wish to proceed east, he checked his movement before it was well started; under the pressure of superior authority he marched his army to a doom which he anticipated. That the Germans should head him, turn him, surround him, under these circumstances is not a bit more wonderful or creditable than that Jackson and Lee should have utterly routed "Mr." John Pope's army at the second battle of Bull's Run. If the Confederate generals had only spoken German their exploits would fill countless pages of confused and confusing translations. Some of Prince Kraft's criticisms are self-contradicting, as when he says that Marshal MacMahon's operations were dictated by the Council at Paris "for fear of a rising in the streets of the capital." "There is absolutely no use in attempting a calm and serious criticism on strategic measures which depend upon the brawlings of a mob; no positive strategic information can be derived therefrom," and yet he goes on to write hundreds of pages about these measures. This sentence would appear to me an excellent reason why British officers should close Prince Kraft's book and turn to authentic accounts of our own operations by the banks of the Sutlej, and the Swat or the Prah.

Some of his criticisms are mere empty sounds and savor of the ridiculous. Discussing the situation on August 28th when MacMahon, who wished to go back, went forward, he says: "For the Marshal there remained only one possible course; to obey passively and to hope that a hostile bullet might reach him at a decisive moment and prove that he had done his duty as a loyal soldier. The enemy's bullet hit him on the hip, not on the breast, but this was not the fault of the Marshal."

I take it that Marshal MacMahon was not such a paltry fool as he is supposed to have been by this German. It was his duty to hope for a long and an honorable life of well-doing. This he attained; and he saved his country from a worse ruin than any foreigner could inflict upon it. I assert, and am prepared to prove, if need be, that not one of the German treatises to which we have referred have been of as much service to any Englishmen as would be a serious study of the basin of the Indus, or of the Irrawaddy, or of the Yangtsekiang, or of the Nile, or the Zambesi, or of the St. Lawrence, or of the Tugela, and any military operations which his race has conducted therein. He can very well do without ever looking at any of the "day-by-day" maps of the operations between Vitry and Dombasle, and Vouziers and Carignan, unless of course these be included in the cur-

riculum of an examination; then he must know all about them, more than any German officer knows about them, or give up hope of ever being employed on the staff in Afghanistan, in Canada, or on the West Coast of Africa. He won't be allowed to do good service on the Saskatchewan, the Zhob, or the Limpopo, unless he can place carefully the XII. Corps and the Guard on the Givonne; nor will he be permitted to set the "division of a battle in array" in the Punjaub any "more than a spinster" unless he can describe the manner in which two Bavarian guns played havoc with a few houses in Bazeilles, September 1st, 1870.

A leading volunteer officer—a Scotch judge—indignantly declared on May 8th, in the Lecture Hall of the United Service Institute, that it was time for some regular officers to stop their futile criticism and cynicism about our military forces and formulate schemes whereby these might be made of real service in the United Kingdom and its dependencies. He said that they would be much better employed at making the best of what we have than of carping at our resources and suggesting nothing practical. Only that I feared to be rude, I could have told him that the brains of our army were too busy with the Franco-German War of 1870-71 to think of anything else at all. Men who are saturated with lore about a magnificent stragetic wheel of 230,000 men to capture a forlorn army of half their number, are too elevated in their ideas to condescend to help us to have a few good brigades of volunteers. People who have always armies of many corps addling their very dreams despise such a thing as a couple of divisions of well-organized British volunteers, or militia, or even a couple of corps of British regulars; they prefer intellectual diet comprised of such sentences as the following, taken from Prince Kraft's twenty-fourth lecture, on August 24th, 1870:

"Behind the cavalry came the corps of the first line, as follows: II. Bavarian Bar-le-Duc and Laimont; V. and Wurtemberg Division Robert, Espagne and Couvonges and Sandrupt; XI. Ancerville and Saint Dizier, advance-guard at Hallingincourt. In second line: I. Bavarian at Trouville, VI. at Joinville, 2d Cavalry Division at Vassy and Daulevant. Headquarters of 3d Army at Ligny; headquarters of His Majesty Bar-le-Duc," and so on, page after page, all to be learned by British officers who could not describe any one manœuvre of Wellington's invasion of France, 1814, or Marlborough's great strategic march to the Danube, 1704.

I admit that I have placed every German and French corps on the blackboard at localities not better known than those quoted about one thousand times; but, to be candid, I am utterly indifferent as to where the Germans were between 24th August and the battle of Beaumont, and I don't care whether the 4th Division of cavalry or the 2d was on the right or left, except for purposes of examination. I should much prefer to illustrate the position of the British at Waterloo, or the war with the Sikhs, or the situations and resources of our coaling stations all over the world, or how we won Canada, or how we lost the thirteen United States, or how, in the "war of liberation," having "saved England by our courage, we saved Europe by our example," and thereby put the ancestors of the heroes of the I. and III. and IX. and XI. corps under very considerable obligations,

indeed, which their descendants are inclined to forget. They can find the exact nature of these obligations in the pages of Alison.

But Hoenig always refreshes me after the official accounts, even as a storm clears and lightens the atmosphere when previously there was a dull gloominess "in the heaven and the rack stood still." The much decried British volunteer will rejoice to learn that his own simple brigadier could not handle his regiments worse than the 38th Brigade was handled at Mars-la-Tour! Falstaff seems to have been the prototype of some of the Xth Corps staff. What are soldiers but "food for powder"? Let us lead them where they may be "well peppered," always provided that they do not hide themselves away somewhere, or get into a panic near a ravine, and almost run over their "beloved king," like some of the VIIth and VIIIth Corps at Gravelotte.

We have had more than enough of German military lore, let us have some British; or, if foreign lore be a *sine qua non*, then, as a lukewarm elector would say, "give the other fellows a chance.' Let us hear what the Frenchmen have to tell us about the art of war; they were supposed to be passed-masters in this mystery till August 6th, 1870, and, perchance, their turn may come again. The Prussians revived, notwithstanding Jena and Auerstadt. "The whirligig of time may still have its revenges."

The *reductio ad absurdum* of the whole of our German craze is that it is absolutely scorned by the Germans themselves. I have had very able young German officers, lecturers in cadet schools, residing with me from time to time. They were completely puzzled by the general ignorance which prevailed among our people of the salient points of our own history. These "strangers in our gates" knew very much more about the development of our empire than the best public schoolboy, and at this they were amazed. In truth, a system of national instruction, from which such national literature and history as ours—glorious beyond compare, far beyond all Greek, all Roman fame—are excluded, is unworthy of the name of "national education" in the true sense of that word. It is a disgrace to our scholastic methods, it is an insult to the intelligence of pupils, it is a scandal in the eyes of foreigners, it is a danger to our imperial and commercial interests, and, by keeping our more prosperous citizens blind leaders of the blind, and, by retarding the growth of patriotism among all classes of society may yet involve every class in some irretrievable catastrophe.

About this there are no two opinions among our wisest statesmen and publicists, and our military authorities have done much to enfeeble the military spirit of our nation by their discouragement of the study of our national annals.

We never refer to any of our actions in the wars of the Spanish Succession or the "Seven Years"; American writers refer to them constantly. And neither Prince Kraft nor Von der Goltz, nor any other German authorities, can keep the "Great King" Frederick out of any of their volumes, yet he fought in the time of Cumberland and of Wolfe. Wellington's campaign in Portugal, 1810-1811, was only quite recently the subject of lectures before the French staff. As I really must say something for an English general, I quote from a leading French professor, writing fif-

teen years after the strategy of Gambetta was foiled by Manteuffel and Werder:

"De la campagne 1810, nous pouvons tirer d'enseignements pour la guerre défensive. Nous voyons, en effet, Wellington préparer avec soin l'échiquier sur lequel il veut opérer; il met ses places fortes en état, il organise les lignes de défense sur lesquelles il veut s'appuyer, il assure ses communications en arrière, il prépare la dévastation systématique du pays; enfin il crée à l'extremité de son théâtre, un vaste camp retranché, qui lui servira de reduit et où il pourra braver et lasser tous les efforts de l'armée offensive," and so on through many paragraphs, completely justifying his contention that the campaign of 1810 in Portugal "nous présente un modèle de la guerre défensive." Personally I have no sympathy whatever with the French, and I should prefer to read all this in the pages of Napier. But, if we must have foreigners, surely a British officer would gain more knowledge that would come home to his own business and bosom from sentences like these than from such silly rhetoric as Prince Kraft's declamation about MacMahon's burning desire to get shot.

But I am exhausting my space, and I will "pray in aid" of my contention, that it is time to cease purveying any more art of war made in Germany for our officers, no less a writer than Von der Goltz himself. His "Nation in Arms" is a most interesting work, and is no doubt worthy of our careful perusal, if we have time, after, not before, we have learned the condition of our own nation's life. Of course it is a work for which Germans ought to be very thankful. But it is based on ideas that have as little practical bearing on British life in this or any past generation, or in any future generation, as the ideas underlying the military life of Alexander's veterans in Bactria, or the ideas which led to Timourlane's tremendous campaigns in Western Asia.

I contend that Goltz distinctly proves that his theories cannot apply to the British Empire. Sometimes he congratulates the United Kingdom on not being situated as is Germany, and sometimes he ridicules the notion that our army is now, or ever can be, similar to that of France or Germany. Further, he admits that the whole elaborate military organism of a continental state is dangerous to an awful degree, and may collapse when a profound and daring genius with a smaller army of perfectly-trained patriots or fanatics appears on the scene, or may be pressed out of existence by the bulk of its own colossal magnitude.

It is not about our army that he writes when he says: "Let us tentatively set the present German army in march upon a road. Of the cavalry divisions, which we here likewise place at the head, each is two-thirds of a German mile in length. Then come the army corps. Even if all the corps closed up in marching order, rank close on rank, and wagon after wagon, yet, in order to make secure, we should be obliged to cover one hundred German miles for the whole eighteen. And then the numerous reserves, which march with them into the field, must also be taken into account. Besides these there are the *oberkommandos*, with their staffs and trains; further, the Army Administration Department, so far as it is not included in the army corps, and much more besides. To our astonishment, a com-

putation of the whole together would show us that if the head of the column were marching into Mayence upon the Frankfort road, the last company would only just be leaving Eydtkuhnen upon the Russian frontier. The whole military road from the Rhine to the Russian frontier would have been thickly crowded with soldiers, guns, and transports. If these were made to pass out through a single gateway, day and night, it would take a fortnight for all to pass through."

Again this is not our army: "Enormous, too, would be the front which the gigantic armies of to-day would present were they developed in one single line. The French army would reach from Épinal to Verdun."

Again he does not refer to British battles when he says: "In the battle of the future 300,000, nay, even 400,000, combatants will oppose each other."

But now this distinguished German refers to us very distintly indeed: "As a rule, a mid-European country is always assumed to be the theatre of a war. A war in the Steppes of Asia, and in the tropical climes of Africa, is quite different in its nature to one in Germany, France, Italy, and so forth. *Only what affects us closely demands our attention.*" Would that Britons would follow the example set by the words which I put in *italics*.

He further says: "Again, we must not advance exceptions like England, whose military system is out of all proportion to the development of the state in other respects. Protected by the sea, and with all its interests dependent upon and bound up with the sea, it has only colonial wars to wage, in which money plays the chief part. This latter is the sharpest weapon in England's hand. *In addition to this, it maintains a fleet such as no other empire can boast.*" The *italics* are mine—I put it to my readers whether Goltz does not prove my case.

It is true all this unequal distribution of subjects in our educational programmes should cease once and for ever; let our officers, like all other sensible persons in every profession, make themselves masters in the first place of what immediately concerns them, and then, if they have spare moments, they can, like other professional men, have literary hobbies or fancies, and they can, if they please, interest and amuse themselves with German ideas, philosophic or military, each equally worthless as far as the well-being of the British community is concerned.

I have before me now a palpable piece of instructional ineptitude. We occupy Egypt, and we are sending troops up to Dongola, and yet officers are asked at the present moment to write long essays about tactical incidents at Woerth. I put it to every reader of these pages if British officers and British civilians would not in this month be much better employed from every point of view making themselves thoroughly familiar with Chapters III. and IV. of the "History of the Soudan Campaign," by Colonel Colville. The headings of these chapters are: "Organization of the Nile Expedition" and "Events from Lord Wolseley's arrival at Cairo to his arrival at Dongola." But to our Germanic theorists the Eberbach is a more important river than the Nile, Langensulzbach leaves Dongola nowhere, Major-General Stein von Kaminski puts a mere Scotchman like Stewart entirely in the shade, and the daring Von Henning aus Schönhoff could

teach not only Generals Douay and Ducrot their business, but could give valuable lessons to Lord Wolseley himself—who, after all, is only an Irishman.

I go further and I maintain that our occupation of Egypt concerns the future history of the world at large much more than does the occupation of Alsace-Lorraine by the XVth and XVIth Corps.

I have Napoleon's authority, oft repeated, for putting the Eastern Question far above all the interests of all the western powers of the European Continent, in so far as they are merely European.

In August, 1797, he wrote: "That the time was not far distant when we should see that to destroy the power of England effectively it would be necessary to attack Egypt. It will open a prompt communication with the richest countries of the East. It will unite the commerce of the Indies and that of France, and pave the way for great captains to march to conquests worthy of Alexander." Even after he had seized the consular sceptre he still looked to the East as the only theatre of great achievements. "There has been nothing to be done in Europe for two hundred years," he said in 1804; "it is in the East only that great things are to be achieved." It was India rather than Moscow that was his goal when he began the campaign of 1812. We have realized his dreams—"we have held the gorgeous East in fee," and yet our instructors drive us away from the careers of Clive and Hastings and Mornington, and from records of the conquest of the Punjaub, the sublime struggle against the Sepoys, the progress of Russia from the Caucasus to Merv, and the war between China and Japan, to such relatively trifling matters as how Von Senden invested Peronne, how the Eupen Landwehr battalion occupied the Rougeot Mill, midnight, January 17, 1871; how the patrol of the Saxons which ought to have marched to Beaumont on August 27 really went to Beaufort, and how the corps artillery of the VIIth Corps was handled by Helden-Sarnowski. I confess to believing that Captain W. Olpherts during the Mutiny made just as handy and striking a use of artillery as the best gunner that Prussia ever produced, and with more lasting historical consequences to the world at large.

Prince Kraft tells us in his 27th letter that Captain von Klenck, Lieutenant von Werthern, and Sergeant Brohmann reconnoitred skillfully; I have no doubt they did, but I hope the time will never come when an English boy would not prefer to hear something about Colonel Waters and Captain Grant.

In fine, I am eagerly looking forward to a volume on strategy and tactics, composed by our own leaders, with illustrations from our own history, and dwelling on the best means of preserving our Imperial Isles from invasion, of maintaining our commercial lines of communication with every part of the globe open and always secure against any hostile interruption, of protecting our Eastern Empire on all its frontiers, of fostering the ever-growing development of our vast colonies, and of giving foreigners to understand that, while our doctrine is one of peace and goodwill, one of our mottoes also is *nemo me impune lacessit*. This volume would also teach our people, our kindred beyond the seas and our continental neighbors, that no modern state has a record of glory and greatness to compare with our own, and will

convey to future historians, who write in other languages, more examples for their treatises of heroic self-sacrifice and desperate deed, of "derring doe," than can be culled from the pages of the most stupendous German annalist. Any officer of our staff whose imagination becomes so elated with dwelling on these splendid themes that he will resolve to devote his professional skill and his ardent and best energies to such a task, will win the admiration and gratitude of his fellow countrymen who are now living, and a place of fame among future generations. He may be well assured that neither our civilians, nor our young soldiers, nor the veterans of our army, nor our legislators, will think one whit the less of him if he makes not the slightest reference to Borny, or to the Hallue, to Loigny, or to Villersexel. If he begins his lofty enterprise by ejecting from his library the "Official Account of the Franco-German War, 1870-71," they will esteem him all the more. For he will thus prove that he has within him a mind that can distinguish between the permanent and the fluctuating values of things, that he is gifted with "a large discourse, with a faculty and godlike reason, looking before and after," that his intelligence is not obscured by the fancies, caprices, and crazes of the day, or, worse still, by that paltry sycophancy which, decade after decade, ever prostrates itself before the victor of the hour.

FIELD FORTIFICATION AS APPLIED TO MODERN CONDITIONS OF WAR.

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(*From Aldershot Military Society Papers.*)

"FIELD fortifications are always useful, never harmful, when they are well understood." Nothing could be more unexceptionable than these words of Napoleon. We have here an axiom of war; but unfortunately, like other axioms, it does not help us in the least. Like the pronouncements of the Delphic oracle, it is carefully hedged. The all-important qualifying clause is left for private interpretation. Under some circumstances it is to be inferred that field fortification is not "useful," and may be "harmful." What are those circumstances? What is implied by that thorough understanding of the whole question which Napoleon regarded as essential to the advantageous employment of field defenses?

The science, if it may be so called, is as old as mankind. In the most elementary forms of human society, extemporized defenses played a part in the adjustment of family or tribal difficulties. The earliest men were called upon to defend themselves, and sought adventitious aids in prolonging their interesting existence The possibilities involved in the use of trees, brushwood, banks of earth, or piles of stones, were certainly recognized at a remote period. The fair-haired strangers with painted faces who invaded the Val d'Ohet, in Viollet-le-Duc's charming "Annals of a Fortress," not only "cut bushes and briars to make a rampart," but set up oval shields fastened into the ground by stakes, thereby anticipating several

modern inventions. In many places, the face of England is still scarred by the works of primitive engineers. It is difficult, in some cases, to understand how these works could have been of real use in warfare; but their existence proves that they were regarded as valuable auxiliaries, and on the principle of the survival of the fittest, the persistence, through thousands of years, of the habit of trench digging, tends to show that pre-historic man must have been right in the main.

Fortification in all ages must have been intended to serve for one or both of two main purposes.

1st.—To secure physical advantage by preventing an enemy's approach, or by shielding the defenders from the effects of his weapons, and thus conferring superiority in the use of their own.

2d.—To secure moral advantage, and by defining in palpable fashion the line intended to be held, to simplify the tactical situation to the defenders.

In the analysis of the ideas here involved, will I think, be found alike the clue to the right understanding for which Napoleon stipulated, and the explanation of some of the apparent anomalies which have tended to obscure the subject of field defenses throughout the long record of military history, we seem to find periods at which, for no apparent reason, fortification usurped a leading rôle on the field of battle. Such periods do not always follow the changes in military weapons. For the most stupendous field-works ever constructed, we must go back to the days of slings and arrows. The increased mobility of armies, the development of road communication, and the gradual attainment of tactical flexibility tended to restrain the employment of field fortifications; but although the extreme limit of both mobility and flexibility seems to have been almost reached, enhanced importance is frequently claimed for the spade. To meet the requirement of indifferent troops, field fortification has been regarded as specially adapted. "Throw up earth," wrote Napoleon to Lefebre, "it is necessary, particularly with bad troops," and elsewhere he recorded the opinion that, "with mediocre troops it is necessary to throw up much earth." Yet indifferent troops have rarely been able to obtain substantial advantage from field-works, and never when opposed to forces greatly superior in discipline and training. As Napier has well pointed out, "against rude commanders and undisciplined troops, lines may avail, seldom against accomplished generals, and never when the assailants are the better soldiers." While Napoleon may be claimed as the advocate of an extended employment of field defenses, the circumstances of his many campaigns prevented him from being a great practical exponent of their military importance. On the other hand, Frederic the Great has recorded that he was "no advocate of intrenched camps unless it were to cover a siege. and even in that case he did not know whether it was not always more advisable to meet the enemy in the field." Nevertheless, Frederic occasionally resorted to intrenchments, and at Bunselwitz may be said to have saved his army thereby, although the risks incurred were certainly unjustifiable.

In seeking to apply the historical method to the subject of field fortification, it is necessary to search for principles. Isolated successes, however

startling, can establish no law, if considered apart from the circumstances. Hasty generalization is the bane of military science, and the most effectual bar to real progress.

The old world art of war culminated with the Romans, to whom fortification, frequently on an enormous scale, became a habit. When in 51 B.C., Vercingetorix with about 80,000 men shut himself up in Alesia, Cæsar with 30,000 men and 6000 horses proceeded to surround the town with a ditch 20 feet wide and deep, extending over a length of eleven miles. As a numerous horde of Gauls, under Comius, threatened the besiegers, lines of contravallation, fourteen miles in length, were thrown up. It is even stated that the lines were tripled, that towers were built 80 yards apart, and that stockades, stakes, and *trous de loup* were employed. This colossal example of field fortification achieved its object. Defeated in a general attack, which is said to have cost the assailants 60,000 men, Vercingetorix surrendered. Three years later Cæsar attempted similar measures against Pompey, who, with a numerically superior force, had enclosed himself within lines 15 miles long having their flanks resting on the sea near Dyrrhachium. Again immense works of circumvallation were thrown up; but Pompey received seaborne supplies, and utilizing his shipping, succeeded in establishing a force on the flank of the besiegers' lines; circumvallation thus failed, as in 74 B.C., it had proved unavailing to hold Spartacus in the Calabrian peninsula; but Cæsar moving off into Thessaly was able to bring his great antagonist to a decisive action at Pharsalia. Although the figures we receive from the ancients are frequently severe trials of faith, it is clear that field-works of immense proportions were employed by the great masters of the art of war 2000 years ago. In the days of Cæsar, and till a much later date, the main object was to create an impassable obstacle. Even if an assaulting column succeeded in climbing into and out of a deep ditch it would evidently meet the defenders at a physical disadvantage, and the delay involved would enable troops to be collected at the threatened point. Further, the existence of a line of rampart would tend to remedy the defects of cumbrous forms of tactics, and thus to confer moral advantage upon the defenders. The intimate relation between field defenses and weapons of war had not arisen.

The age of chivalry was not favorable to the progress of field engineering, and in 1700 years few changes appeared. The lines which Marlborough was frequently called upon to attack in Flanders, and which he invariably succeeded in piercing, scarcely differed in conception from those of Cæsar, except that the engineers of the beginning of the eighteenth century were relatively moderate in their profiles. In a delightful French book, "L'Art Universel de Fortifications," published in 1674, the subject is systematically treated and brought up to date. Primitive simplicity was by this time beginning to be merged in mere ingenuity, and small details usurped the place of principles. The book is eminently typical of a long series of successors, except that the writer—a thorough enthusiast—claims for the defense a monopoly of the virtues. The attacker is, he holds, usually wicked and generally in the wrong, while the defense possesses a two-fold advantage. This latter idea is enshrined in such verse as the following:

"La defense est digne d'envie ;
Elle sçait par un mesme effort,
Conserver pour les uns la vie
Et donner aux autres la mort."

Lord Orrery's "Art of War," one of the earliest English books on the subject, contains some interesting reflections on the warfare of the time. "Battels," he writes, "do not now decide national quarrels and expose countries to the pillage of the conquerors as formerly. For we make war more like foxes than lyons, and you will have twenty sieges for one battel." Nevertheless, he considers that field defenses were not sufficiently employed, and he urges a closer approximation to the practice of the Romans. "At least if we would do no more, I could wish that we did but so much, as whenever we camp, though but for a night we would at the angles of those great enclosures we lodge in raise little bastions or flankers of earth and sod * * * and if you come to camp in an open place, only but raise little bastions or small redoubts round the ground you camp in, a musquet shot the one from the other; and instead of a line draw carts, wagons, and carriages between the several redoubts, (leaving avenues), which is done in little time and with much ease. Here, therefore, nearly 200 years ago, we find an advocate of slight works such as we now term hasty defenses, and even a laager, which we are accustomed to think was invented in South Africa, is plainly indicated. Flank defense also has asserted itself, for "'Tis to be observed as a standing rule that at the distance of every musket shot point blank, a flanker must be made, either a redoubt, or a ravelin, or a bastion, etc." In regard to the fortification of standing camps, Lord Orrery gives many details curiously resembling those prescribed by Polybius 1800 years previously. Among other remarkable provisions he lays down that "The colonel's lodgement and every particular lodgement of each captain is invironed with an entrenchment five feet high." Whether the colonel and each individual captain was intended to remain in his separate zareba during a general attack is not stated ; but, in this case, their presence would scarcely be of much use to the defenders.

Up to and beyond this period, armies were generally slow moving bodies; military operations were excessively deliberate and wars prolonged. Field defenses were thus applied to strategical rather than to tactical purposes, and positions once taken up and fortified were not lightly abandoned ; since it was in accordance with good precedent that the enemy should sit down in front of them and intrench himself in like fashion. The tactical immobility which such defenses entailed appeared to be no disadvantage, and the idea of a local strengthening of a battle-field which would be no bar to offensive action had scarcely dawned. Moral protection, or the avoidance of contact, being the object mainly sought, it followed that, when confronted by the brilliant generalship of Marlborough, field defenses did not show to much advantage.

The slow-moving antagonists of Frederic the Great evinced a tendency to intrench themselves on most occasions. In the battles of Prag, Leuthen, and Torgau, the Prussians successfully attacked strongly fortified positions. At Lobositz and Zorndorf also the Austrians and Russians respectively em-

ployed earthworks in vain. The losses of the defending forces at Leuthen, Torgau, and Zorndorf were relatively enormous. On the other hand, Frederic was disastrously defeated by the Russians at Kunersdorf, the losses of the Prussians on this occasion being excessive. The balance of advantage in 13 great battles lay with the more mobile armies of Frederic, and Daun's victory at Hochkirk was won by abandoning strong intrenchments and fighting a purely offensive action. On the whole, it does not appear that, even when attacked by inferior numbers, field fortification proved any palliation of shortcomings in training or generalship, and the causes of victory and defeat cannot be discovered in the use of the spade.

Napoleon, as the inaugurator of an era of increased mobility and tactical flexibility, and the great teacher of offensive war, looked to living force as the arbiter of victory, and while himself making few demands on passive auxiliaries was accustomed to make light of those of his antagonists. In Emerson's words, "He conquered Europe by the bivouac, which consisted in falling back on naked valor and disencumbering it of all aids." Disaster produced a change, and after the failure of the Russian campaign, and the retreat from Germany in the following year, Napoleon ordered strong defenses to be thrown up round Madgeburg, Dresden, Breslau, Danzig, and several other places.

This strategical use of fortification completely failed in its object. The isolated French garrison inevitably surrendered as the Allies advanced to the Rhine, and 80,000 troops, whose presence in the field was sorely needed, were lost to the Empire.

In the Peninsula, when the military conditions demanded a defensive policy, the Duke of Wellington employed field defenses with consummate judgment. Two examples, memorable for all time, remain to us. Assuming that the retreat after Busaco was necessary, strategical requirements were exactly met by the previously created lines of Torres Vedras, which guarding the sea base in Portugal, gave security to the army and leisure for preparation. Tactical requirements were as completely fulfilled by the employment of simple field defenses at Talavera. The position was naturally strongest on the right. Pedantry would therefore have suggested a concentration of effort upon the left. With Wellington, however, were Cuesta's Spaniards, much demoralized after their recent defeat at Alcabon. By artificial aids, he could render his right almost unassailable. One or two rough redoubts, a convent prepared for defense, "ditches, mud walls, breastworks, and felled trees," sufficed for the purpose, and there the Spanish troops were securely posted. "In this position," writes Napier, "they could not be attacked seriously, nor their disposition be even seen; and thus one half of the line necessary to be occupied by the Allies was rendered nearly impregnable and yet held by the worst troops." The absolute correctness of Wellington's dispositions was proved by the event. The brunt of the French attack fell upon the left where it was met by British troops, and the gallant charge of the 48th Regiment fitly ended a memorable battle.

The period beginning with Frederic the Great, and ending with Waterloo, showed, on the whole, a diminished employment of field-works. The

habits of the fox were partially, at least, exchanged for those of the lion, and Lord Orrery's description of warfare in 1707 became inappropriate in less than a hundred years. While the development of the musket and the field-gun appeared to involve increased material protection, the growing mobility of field armies operated more powerfully in an opposite direction. At the same time comparatively light trenches with obstacles, which though not impassable served to delay an attacking force, began to make their appearance. Closed redoubts, differing little from those of the ancient Britons, continued to be employed and were usually armed with artillery. Where it was desirable to deny some special feature in a position to an enemy, or where, as at Torres Vedras, a long line was to be artificially strengthened, they served their purpose. Finally, villages, buildings, and small enclosures advanced in military importance. They could in a short time be rendered defensible by the musket; they provided complete protection against cavalry; and where their situation chanced to be such as to render their occupation tactically advantageous, they were able to influence the course of a battle. Nevertheless, throughout this period, taken as a whole, the rôle of field defenses may be said to have been subordinate.

In the Russo-Turkish campaign, only 13 years after Waterloo, warfare seemed to have suddenly reverted to the Marlborough era, and the attack and defense of positions largely defended by field-works engrossed the whole energy of the combatants. The Crimean War closely followed suit, except that effort was mainly concentrated upon a single objective, and that in extent the earthworks on both sides almost approached those of the Romans. Yet in the Italian campaign, a few years later, when the rifled gun made its appearance, the part played by field defenses was insignificant. The village of Montebello, roughly barricaded by the Austrians, was taken after two hours fighting by an inferior French force, and the loopholed enclosure of the cemetery of Solferino withstood attack for some time, but did not materially affect the issues.

Many causes combined to bring a large part of the American contest into the category of a war of positions. Materials for extemporized defenses abounded; great natural talent for field engineering was available; fortification was profusely employed on both sides; and front attacks, usually repulsed with great slaughter, prevailed. In the Atlanta campaign, however, General Sherman clearly showed the uselessness of intrenched camps when they can be turned. Nevertheless he unsuccessfully assaulted the Confederate position at Kenesaw Mountain with a loss of about 3000 men to less than 450 of the defenders, alleging as his reason "that the enemy and our own officers had settled down into a conviction that I would not assault. All looked to me to outflank. An army to be efficient must not settle down to one single mode of offense. * * * I wished, therefore, for the moral effect, to make a successful assault on the enemy behind his breastworks."

The Danish war of 1864 inevitably tended to reduce itself to the attack and defense of a fortified position. In the campaign of 1866 the Austrians elected to fight the decisive battle of Sadowa in a position previously prepared, but important tactical points were neglected, and beyond somewhat increasing the loss of the Prussians, the field defenses thrown up were of

little avail. The lessons of Aspern and Essling had been forgotten, and even the village of Chlum escaped the attention of the Austrian staff. Tactics and field engineering were unhappily divorced.

In 1870 71 field defenses were extensively employed on both sides, but with a difference. While the French, like the Austrian antagonists of Frederic, sought their aid in the vain hope of thus mitigating the evils of a defensive attitude, the Germans used them chiefly for purposes of investment. At the same time, when tactically on the defensive, as in the fighting on the Lisaine, the Germans availed themselves to the utmost of field fortification. After the action of Villersexel, "the respite accorded by the enemy," writes Von Moltke, "was turned to account with the greatest eagerness for digging rifle pits, building batteries, etc." In spite of the great numerical superiority of Bourbaki's army, the attack was shattered, and the three days fighting cost the French "from 4000 to 5000 men," and the Germans only 1200. The efficacy of slight works against front attack was strongly asserted during this war, and much fighting took place for the possession of villages which, when prepared for defense, proved to possess considerable resisting power. The importance of roughly fortifying a position as soon as captured was strongly shown; but as Captain Goetze points out "it was only towards the end of the campaign that the German army recognized the necessity of intrenching, even during the fighting, conquered positions." Even the day after the conclusion of the armistice at Paris the following order was sent from Versailles to the officer commanding at Tours: "Put everything in train to dispute the possession of the town quarter by quarter up to the bridge."

The possibilities involved in the use of field fortifications by an army acting both strategically and tactically on the offensive is unquestionably one of the many lessons of war. Closed redoubts were constructed by the French, notably at Paris and Belfort, and the large fortified camp of Conlie astride of the railway from Laval to Mans; but the Germans rarely employed them, relying principally on simple trenches and obstacles supplementing existing features adapted for defense. Field fortification was in fact regarded as an expedient for delaying an enemy with a view to give time to bring up troops, rather than as a specific means of obtaining a victory. Confidence was reposed upon men capable of being handled as circumstances demanded, not upon works tying troops to fixed positions. This principle appears to have been consistently observed in the investment of Paris and Metz, notwithstanding that the numerical strength available for these operations was a bare minimum. Reviewing the experience of the first great campaign in which the combatants were armed with the breech-loader, I think it is clear that the intimate connection between tactics and field defenses was powerfully affirmed, but that the latter did not show the enhanced importance which might have been expected. The repulse of the first attack on St. Privât, where the Prussian guards lost about one-third of their strength, cannot be credited to fortification, as the French had done little work at this point, and throughout the war no village developed a power of resistance comparable to that exhibited at Zaatcha in 1849. The story of the successive efforts made by the French against this little place, as told in

the late Colonel Brackenbury's valuable handbook, serves, like that of Saragossa, to prove what could be done by determined defenders in spite of inefficient weapons.

In the Russo-Turkish War of 1877-78, military science seemed almost to have fallen back two centuries. It was hastily assumed that the campaigns of the future would turn upon the creation of Plevnas, and that we were confronted with new conditions. Yet it may fairly be argued that field fortification destroyed such prospects of success as lay before the Turkish armies; that the principal lessons of the war were as old as the days of Cæsar; and that the demonstration of the hopelessness of a policy of defense was complete. Having totally underestimated their requirements, the Russians found themselves in a numerical inferiority in Bulgaria, and the failure of the second attack on Plevna rendered their position apparently critical. An inferior force had attacked an enemy in a position naturally strong and well intrenched, and Krüdener's failure was in accordance with all precedents. Field defenses discharged their functions in the usual way, and the repulse should have been equally disastrous in the days of the musket. The question now was whether Osman Pasha's victory would be turned to account. The Turks, however, busied themselves in adding to the defenses of Plevna; Mehemet Ali's advance hung fire, and happily for the Russians, the Roumanian army was ready to hand. The strategical opportunity was lost, and the arrival of strong reinforcements changed the situation. Thenceforward the defenses of Plevna, however laboriously developed, lost all real importance. They could contribute to the repulse of the great assault of the 11th September with its needless sacrifice of life; but their existence was the direct cause of the loss of Osman's whole army.

The universal employment of closed redoubts is the most significant feature of the Turkish defenses. At Nicopolis, Plevna, Lovtcha, along the route from Plevna to Orchanie, in the Balkans, at Shenovo, and elsewhere, such works were thrown up, and at Plevna were largely supplemented by trenches. Of obstacles other than ditches little use was made; the Turks sought to attain the maximum amount of protection from projectiles compatible with the use of their rifles, and wholly irrespective of the tactical limitations involved. Once settled down in such a position as Plevna, they seemed to have regarded passive defense as an end instead of a mere means, and proceeded, with much technical aptitude, to make themselves as secure and as comfortable as circumstances would admit. The development of overhead cover, both inside and outside of the closed works, was exceptional, and minor details of every kind were not neglected. "The com'orts with which the Turkish soldiers are surrounded are worthy of attention," writes Kouropatkin; "the interior slopes are provided with holes in which water, and sometimes honey and biscuits, are placed for the use of the combatants. A portion of the cartridges are placed there, the rest of the ammunition remains in boxes at the bottom of the trenches." All this is admirable in its way, but it was exactly calculated to promote an immobility, which in the long run is necessarily fatal. On the other hand, the Russians had to re-learn by bitter experience one of the important lessons of the Franco-German War—the necessity for being prepared at once to

strengthen a captured position. "A soldier in our army," said Skobeleff, "when he advances to the attack over difficult ground, especially on a hot day, relieves himself first of all of the intrenching tool. * * * When the troops obtain a position which they ought to hold, they have no longer the means of covering themselves from an enemy's fire." Thus, in the third battle before Plevna they "dug, or rather scratched, the very hard ground with their hands, with bayonets, swords, or mess tins," in vain. But the lesson was learned, and the men of the 16th Division carried spades weighing more than 5 lbs. from Plevna to Constantinople. Village fighting was not nearly so frequent as in 1870-71, nor did the Turks show as much aptitude in this direction as in the defense of earthworks.

In Armenia, as in Bulgaria, the Turks based their military policy upon the defense of fortified positions, and here, also, some measure of initial success resulted from the inadequacy of the forces with which the Russians opened the campaign. The temporary resisting power of fortification was not, however, so fully demonstrated in Asia as in Europe. The attack of the position of Zevin by an inferior Russian force was repulsed, but Ardahan and Kars were successfully assaulted without excessive loss, while the intrenchments on the Aladja Dagh merely consigned Moukhtar Pasha's army to ruin.

In the brief war between Servia and Bulgaria, the small-bore rifle on one side and time shrapnel on the other made their appearance. Having about 70,000 men concentrated near the frontier at the outbreak of hostilities, the Servians were easily able to drive back the small Bulgarian detachments and invade on three lines. To gain time to bring up troops was vital, if Sofia was to be saved, and the position in front of Slivnitza, about sixteen miles from the capital, was therefore roughly fortified. Shelter trenches, arranged in some places in tiers, three emplacements for guns and two redoubts, one on each side of the high road, completed the simple preparations. The extreme right rested on spurs of the Balkans and was not artificially strengthened. On the weak left flank, the shelter trenches were bent back at an angle. The troops available on the 17th November, 1885, were totally inadequate to man the works; but even on this day the Bulgarians took the offensive on the right, and a half-hearted Servian attack on the centre failed. On the second day, five additional battalions, one of which was sent up from Sofia on horseback, were available, and the weak left flank having been reinforced, repulsed a Servian attack. Later in the day, the centre and right were attacked, and on the latter the Bulgarians again took the offensive with the bayonet, following up their advance on the third day, when a final attack on the left centre was repulsed. The Bulgarians now made a general advance and quickly swept the enemy across the frontier. Except possibly on the left flank, the value of the field defenses of the Slivnitza position was chiefly moral, They probably imposed upon the Servians who showed little eagerness to get to close quarters, whose fire was exceedingly wild, and whose old type artillery using common shell proved no match for the Bulgarian guns. The great victory gained by the youngest army in Europe, deprived at the outset of the war of all its staff and superior officers, was due to the extraordinary marching

capacity of the Roumelian Militia, and to the great military qualities and personal exertions of Prince Alexander. The fighting at Slivnitza affords a memorable example of an army which could employ field fortifications for a temporary purpose without suffering the slightest loss of offensive power.

In the Chilian Civil War of 1892, the magazine rifle may be said to have made its *début*, a cargo of Mannlichers, together with a German Chief of the Staff, having been imported by the Congressionalists. The latter proved a more potent military factor than the former. The Balmacedists adopted a purely defensive rôle with the usual results. Strongly posted on the left bank of the Aconcagua river, they allowed themselves to be turned on both flanks by an inferior force ill provided with ammunition and disposing only of "a few mountain guns." They then fell back upon the fortified position of Vina del Mar. Here their field defenses imposed upon the imagination of the Congressionalist brigadiers, who declared that "it was impossible to make a successful attack upon the enemy's impregnable position, which had been considerably strengthened by earthworks." The original intention of the Chief of the Staff was, therefore, abandoned for a long flank march in order to approach Valparaiso from the south. The field defenses of Vina del Mar thus fulfilled their object in a negative way, and a grand chance was offered to the Balmacedists. Offensive action, however, did not come within their purview, and they merely awaited attack at Placilla, a position stated to be as strong by nature as that of Vina del Mar. Here the decisive action was fought, the loss of the defenders being nearly double that of the Congressionalists, who at once entered Valparaiso.

Of the present war in the East, one of the principal lessons is that field fortifications are valueless when military qualities are not forthcoming in the forces intended to hold them.

In the period extending from the war of 1859 to the present day, the employment of field fortification appears to have undergone violent fluctuations. The steady approximation to system, which might perhaps have been expected to result from modern science and the exigencies created by modern weapons, cannot be traced. If any marked change can be attributed to the breech-loader, it is the increased efficacy of rough and ready defenses completely subordinated to tactical requirements. For the rest, the experience of our own day closely resembles that of the past. Where, for any of several reasons an army believed itself to be distinctly inferior to its antagonist, it has usually made large demands upon field defenses. Once let loose, like the genii from the jar, fortification has frequently dictated the whole policy of a war, with results generally disastrous. The initial attraction of the defensive probably lies in the moral rather than in the physical aspects of field-works. Want of capacity for handling troops in the field on the part of generals, deficient training or morale of the troops or themselves, belief in the relative ease and simplicity of fighting a battle in a fortified position, hope of being enabled alike to restore confidence and to remedy defects of organization and tactical instruction—these seem to have been the main motives. The result has rarely justified the means, ex-

cept in face of an enemy almost equally deficient. The protracted defense of such a position as Plevna distinctly tends to unfit troops and their leaders for offensive operations. It is true that a species of organization may be perfected; but such an organization being directed to a special and limited purpose is unsuited to the requirements of the field.

Reviewing the long and checkered history of war, and regarding broad results rather than mere interludes, I am inclined to think that the disadvantages of field defenses, as usually employed, have outweighed the advantages gained, and that the disproportion has increased with the growing mobility of armies and the great development of the means of communication. Even where, as conspicuously in Bulgaria in 1877, or in Chili in 1892, field defenses have appeared, directly in the one case and indirectly in the other, to open out one of the happy chances of war, the strength of will necessary to enforce an abrupt renunciation of the charms of defense has often proved wanting, and the opportunity has been thrown away. Well might Napoleon carefully hedge his commendation of field fortification!

Where an auxiliary, whose value under some conditions is undoubted, proves to have been a frequent source of military disaster, an explanation must evidently be forthcoming. This explanation may perhaps be found in a tendency to regard fortification as a species of cult, a separate study, a science with its own special laws unintelligible except to the initiated. To this tendency, now perhaps passing away, may be traced many illusions. Thus we find that fortification has been sometimes regarded as an end instead of a mere means, that it has been permitted to impose conditions upon strategy and tactics instead of being made absolutely subservient to both, and that a remedy for defective organization, generalship, training, or morale has been sought in its employment. Paradoxical as the proposition may appear, I think it will be found to be generally true that fortification, whether permanent or field, whether inland or on a sea-board, is of value only out of regard to the operations that may be carried on outside its rayon. For the principal function of fortification is to gain time, and time is valueless unless it can be turned to account. The best field defenses, the defenses which alone can contribute to real success in war, are those which are completely subordinated to a strategical or tactical plan and which least tie down troops to fixed positions or a stereotyped course of action.

The employment of fortification in modern war may be divided into two categories:—

1. Defenses usually thrown up for strategic purposes, to supplement or to supply the place of fortresses, or to strengthen positions the importance of which arises out of the circumstances of war or its unforeseen developments.

2. Defenses constructed in the field for tactical purposes in immediate anticipation of or during actual fighting.

The various specific objects to which field fortification may be applied are catalogued in text books and recapitulation is superfluous. All will be found to group themselves under one or other of the above heads. Defenses originally belonging to the second category may become merged in the first. Thus, the rough defenses which were thrown up directly the

army of Prince Frederick Charles drew its cordon round Metz, and which contributed to the repulse of Bazaine's attempt of the 31st of August to break out, were steadily developed up to the date of the capitulation, while it became a strategic object of supreme importance to keep a fast hold upon the French army. Similarly, in 1877, the slight defensive preparations which could not have been needed to enable 20,000 Turks to repulse the divided attack of 9000 Russians grew into an intrenched camp of great strength, which for a time asserted a strategic influence upon the course of the campaign. The first, or strategical, use of field fortification, appears to have lost value in proportion to the increase in the mobility of armies. Napier has clearly indicated the dangers and the drawbacks involved in the creation of large intrenched camps and extensive covering lines, "by which soldiers are taught to consider themselves inferior in strength and courage to their enemies." The experience of modern war has added force to his views. Pemberton intrenching himself at Vicksburg, Osman at Plevna, Mouktar in the Armenian campaign, supply object lessons which should never be forgotten. If field fortification is in future to be advantageously applied to strategic purposes, the plan of campaign must dictate its employment—not the fortification the plan. Even then the following questions must be asked, and answered in the affirmative: "Can this intrenched position be held long enough to effect any real object?" This Plevna could not. "If invested will it detain a larger force than is required for its own defense?" This Metz did not. "Is there reasonable hope that its existence will not draw to it forces needed in the field?" The lines of Torres Vedras fulfilled these conditions, for they had the resources of England at their back, and Wellington did not rely only on his field army for the defense of his redoubts. As Napier has pointed out: "A great fleet in the Tagus, a superb body of marines sent out from England, the Civic Guards of Lisbon, the Portuguese Heavy Artillery Corps, the Militia and Ordenança of Estramadura, furnished altogether a powerful reserve. The native artillery and the militia supplied all the garrisons of the forts on the second and most of those on the first line. The British marines occupied the third line; the navy manned the gunboats in the river and aided in various ways the operations in the field. The recruits from the depots and all the men on furlough being called in, rendered the Portuguese army stronger than it had yet been; and the British army, reinforced * * * both from Cadiz and England, and remarkably healthy, presented such a front as a general would desire to see in a dangerous crisis." Within the lines of Torres Vedras, therefore, lay all the elements necessary to an offensive campaign. Here preparation could be quietly made for the future advance. Masséna's force, if doubled, and if it could have been supplied, would not have sufficed to invest the position securely. For Wellington's field army, unhampered by the widely separated redoubts, could have struck out hard in any direction, and the weapons of 1810 had far less delaying power than those of to-day. Of the battle of Noiseville, Von Moltke writes, "The 137,000 French of the Army of the Rhine who had issued from Metz on August 31st had been repulsed by 36,000 Prussians," and throughout the investment, the army of Bazaine was held

prisoner within the fortress by a numerically inferior force. Modern weapons, by adding to the resisting power of field defenses against front attack, have increased the difficulty of breaking through an investing line once firmly established. The purpose served by the stupendous works of the Romans, extending over many months, can now be more perfectly accomplished in a few days by a force whose handling and tactical training is efficient. If of two equal forces, the one is shut up in an intrenched camp invested by the other, the greater military disabilities lie with the former, which would find itself cut off alike from active participation in the campaign and from food supplies, unless it either succeeded in a front attack or invoked the aid of an independent force from outside. In this case at least, the idea that fortification is an effective substitute for men seems illusory.

Field fortification in its tactical and less ambitious form will undoubtedly enter largely into the wars of the future. Opposing armies can rarely clash promiscuously together like nebular molecules aggregating to form some new world. Conditions, frequently topographical, will determine which shall await the attack of the other. In such a case, the waiting force will resort to hasty defenses, and may do so without lapsing into a purely defensive rôle; while the attacking force if it succeeds in capturing an important point within the position, may be driven to seek artificial aid in delaying counter-attack until fresh troops or further successes have made the foothold secure. If the full benefit is to be derived from artificial preparations by the army thus acting initially on the defensive, the preparation must be absolutely subordinated to tactical considerations. The questions, "Is this a good site for a redoubt, a gun epaulment, a line of shelter trench or of obstacles?" do not arise. Instead, it must be asked, "Where can infantry and artillery be most advantageously posted, and when so posted, can artificial cover be advantageously provided for them? At what points is it desirable to definitely check an enemy's advance, and can obstacles be here created which will in no way impede freedom of tactical movement?" The distinction between the two points of view is far greater than it may appear. For in the purely tactical aspect the relative importance of different measures of preparation will appear in their right order. It may easily happen that improvement of communications—ranking last in some text books—ought to take precedence of any trench digging, and cases are conceivable where a liberal supply of sign-posts might prove of more value than a redoubt.

In the little German Manual of 1893, the principles intended to govern the employment of field fortification are most carefully laid down. The following sentences are typical of the whole:—"The general plan of action determines the employment of field defenses. It is essential that they should, in every case, subserve the intentions of the plan, and that they should not dominate them. The latter case arises when work is begun before the intentions are settled. Premature preparation of the ground is directly injurious and hampers freedom of movement. The circumstances of war decide the choice of a position, which will usually be approximately settled according to the map before closer reconnaissance takes place.

* * * The position selected is always to be regarded from the standpoint of the attacker and, where possible, studied from the outside. If it is determined to fortify a position, it must be decided whether a decisive action is to be fought or whether time only is to be gained. Strong obstacles in front of a position induce an enemy to undertake turning movements and are often impediments to counter-attack. * * * Before commencing to fortify a position, the distribution of the troops in it must be made clear."

The whole of this little work is well worthy of being translated. Comparing it with our own manual of the same date, a marked difference of national characteristics and tendencies becomes apparent. The one is strong in principles and curiously general in details, the other is weak in principles and mathematically precise in details. In the one, tactics and field fortification are interwoven; in the other, military engineering is practically treated as a separate and special subject. I venture to think that the view consistently upheld in the German instructions is unquestionably correct, and that only by the absolute subordination of field fortification to tactical requirements can real military advantage be obtained.

The great increase of range of the rifle seems to demand full elasticity in preparations for defense. The limited field of fire of the musket has been exchanged for an era of possible fire effect relatively immense. The restriction of a firing line to fixed positions should thus, more than ever, be guarded against, and facilities for rapidly reinforcing or extending it to meet unforeseen developments have become supremely important. Similarly, field artillery must jealously preserve its freedom of movement, and submit to no restraints imposed by field defenses. In providing it with artificial protection, this must never be forgotten, and to coop it up in a field redoubt is rarely admissible.

Cases will occasionally arise when a force so small as to be limited to passive defense may be called upon to delay a greatly superior body at some specific point. Here the use of field defenses to the full extent which time and means allow is evidently justifiable. More rarely the nature of the ground may define and limit the possible field of fire of guns. Artificial protection may then be freely applied, subject only to the condition that the guns can be easily sent to the front or withdrawn. Such cases, however, do not affect the general principle, and natural tendencies, stimulated by the considerable number of tools now carried by all field armies, will suffice to insure that full use is made of field defenses.

I have purposely refrained from entering into the technical details, which are dealt with at length in all text-books, and which are after all of secondary importance. Most of them are matters of common sense combined with a knowledge of the scope and requirements of the rifle and field- or machine-gun. I will, however, mention a few considerations which have some bearing on the defenses of the future. Our estimates of the amount of work to be obtained from troops in the field are, I venture to think, somewhat sanguine. Moreover, the accurate adjustment of individual tasks will frequently be impossible. Ample working parties must be employed and must be carefully supervised by their own officers. The general tendency is to make shrapnel and case the only projectiles of the field-gun. Nothing will, there-

fore, be gained by thick parapets. Shrapnel would, however, be extremely effective against men behind a wall thin enough to be breached, while two walls with an intervening space will give good protection until shell begin to reach the second. It follows that in the preparation of a village for defense, the firing line should, if possible, be kept outside and at a short distance from the buildings which will provide good shelter for reserves. This does not, of course, exclude the desirability of preparing a village for interior defense. As against shrapnel fire, not of a plunging description, a strongly built village should afford great protection. This, and other considerations, will unquestionably lead to the employment of field howitzers, firing common shell with a high explosive burster, as well as shrapnel. The Russian howitzer batteries and our own 5-inch equipment are too heavy for general employment in the field, while even if the weight of the howitzer itself is kept within field limits, the transport of a large supply of ammunition becomes a serious matter.

Opposed to howitzer fire, parapets would require to be thickened so as not to be breached by a single shell falling upon them. Overhead cover, giving complete security against the high angle fire of large shells with delay fuses, will usually be unattainable in field defenses; but on the other hand, the use of the delay fuse involves loss of effect in moderately soft ground, the shells being smothered except when they chance to light upon a field casemate. With a high explosive shell, it is probable that the best moral and material effect will be attained with a direction action fuse. Although the searching effect of field shrapnel has its limits, the provision of light overhead cover appears desirable for such troops as are necessarily kept in close proximity to works. Loss among men who are doing nothing is specially discouraging, and to confer a sense of security on those who are either resting, or are held in immediate readiness to repulse an assault, is a distinct advantage. One small detail seems worth notice. The German handbook shows, in every section, a small interior berm, or shelf, about one foot below the level of the crest of the parapet. This is intended to give a rest for the elbows of men firing, and at the same time to provide a convenient position in which to lay spare packages of cartridges. It is possible that this arrangement might check the general tendency to fire high and serve to steady the shooting. Finally, I think that, in the field defenses of the future, invisibility will be of the greatest importance. With a little care and some small sacrifice of formalism, this can be obtained under most circumstances, and advantage may thus be derived from smokeless powder which would be lost by self-advertising works. Against artillery fire, invisibility is the best form of protection, and even when the field howitzer makes its appearance, well-concealed defenses will have little to fear.

The field defenses of the future may be of far slighter construction than those of the past, The objects which the earthworks of the Romans were intended to accomplish can now be attained by shelter trenches. The full development of fire has become of the first importance. The provision of physical protection, however desirable, is secondary, while moral protection is sometimes illusory, and rarely confers positive advantages. The

army which is able to completely subordinate field fortification to tactical requirements, using it whether in attack or defense as a mere auxiliary, will win deserved success. In proportion, however, to the growing power of weapons will be the difficulty of moving men once ensconced behind earth. Only good troops, well commanded and carefully trained in peace time, will therefore derive full benefit from field fortifications.

The needs of the future will, I think, be best fulfilled by regarding field engineering as an adjunct of tactics frequently desirable and occasionally indispensable, by treating the two subjects as essentially one, and by sinking specialism in general military considerations. All arms should share alike the instruction necessary to place a position deliberately occupied or captured from an enemy, in a state of defense. And while the infantry and artillery officer should each realize the extent to which artificial protection can usually serve the purpose of his arm, the engineer, seeking to understand the real needs of both, should bring all the technical knowledge at his disposal to their assistance. Thus safeguarded against all chance of being treated as an object *per se*, field fortification may be trusted to fulfill the conditions which Napoleon laid down, and its employment will then be "always useful, never harmful."

GERMAN IDEAS UPON CERTAIN QUESTIONS RELATING TO FIELD ARTILLERY.

(An analysis of some articles in the "Militär-Wochenblatt.")

Translated from the *Revue d'Artillerie*

By First Lieut. GEO. W. VAN DEUSEN, 1st U. S. Artillery.

DURING the past year a series of important articles has been published in the *Militär-Wochenblatt* relating to the mobility, armament, tactics, and organization of field artillery, at present and in the future. We give below a brief analysis of these studies, limiting ourselves to those questions of general interest.

I. MOBILITY OF ARTILLERY.

"Has the artillery reached a condition of mobility in which it can fill all the requirements that may be demanded from it? If not, what is the remedy and how should it be applied?"

Four anonymous writers have given their opinions on this question. We will call them "A," "B," "C" and "D."

1st. *Opinions of "A."*—Neither in Germany nor in other military nations has this end been obtained as yet.

The value of artillery depends upon two factors; maximum strength and accuracy of fire, and the ease with which it can be brought quickly and safely to the point where it is needed.

The field artillery firing school attends to the first factor and the thor-

ough instruction of this institution gives results which are all that can be desired.

The actual state of affairs as to the second factor is far from satisfactory as the mobility falls much below the requirements. This factor depends upon the condition of the horses, skill of the drivers and weights of the carriages. In this connection it may be of interest to consider the weights of carriages in the German service, loaded for action, which are:

		Mounted Batteries.	Horse Batteries.
Piece carriage.	Without cannoneers....2005 kg. With 5 cannoneers.....2395 kg.		1930 kg.
Caisson.	Without cannoneers....2045 kg. With 6 cannoneers.....2515 kg.		2030 kg.

The value of the teams depends upon the quality of the horses and the amount of training which they have received. As the remount service of the artillery is almost entirely at the mercy of the cavalry, the horses received by the artillery are generally notably inferior to those of the cavalry. There are two extreme sets of ideas on the subject of training, one side claiming that the horses should simply be broken to the saddle, while the other demands a riding school training of the highest order. Until this point is settled, the selection of artillery horses can not be founded on a substantial basis; it will depend upon the individual views of remount commissioners and upon their kindly feelings towards the artillery. What degree of purely equestrian training should be given the horse in order to obtain the best draft service from him? In discussing this question the writer goes into numerous considerations regarding the nature of the horse and the relations between it and the driver. He claims that, to have horses in good marching condition, not wasting energy by jerking about during halts, performing the drill evolutions and avoiding obstacles properly, the training should be the same as for saddle horses, and that drivers should be instructed in a corresponding manner. This desideratum, the writer says with a slight tinge of bitterness, is neither compatible with the present remount system nor with the limits imposed by a condition of peace; he concludes thus: "The normal heavy cavalry horse seems to me the ideal draft horse, and before being used for draft purposes, should be put through a riding school training equal to that of the cavalry."

The instruction of the drivers should also be much improved under this system. The amount of this instruction has also given rise to much discussion. In actual drill they go through the evolutions with more or less skill, but without any fixed system. Now such a system is an urgent necessity, as the ideas and experience of one set of officers will probably not be the same as their successors. The remedy will be found in a school for the instruction of drivers, who, in turn, would act as instructors for the regiments and thus a uniform system founded on fixed principles would be established.

2d. *Opinion of "B."*—(Answer to "A's" arguments.) I agree, says this writer, that every attempt to increase the mobility of the artillery is most laudable, but I deny that under ordinary circumstances this mobility will be deficient. The Autumn manœuvres have demonstrated that the ar-

tillery will be in the proper place at the proper time. Therefore, why should such assertions be made to impair the confidence reposed in this arm by its sister arms?

If, on rare occasions, we were called upon to deplore the absence of the artillery from its proper place during the Autumn manœuvres, the fault for this in the majority of cases could properly be ascribed neither to the arm itself nor its mobility, but should be placed elsewhere. The tardy arrival on the line might be due to one of the following causes:—1st—The artillery had not been given its proper place in column, and some prematurely given order caused the line to be formed before it could come up.

2d.—The artillery being in its proper place, the slowness of its commander in making up his mind caused a delay.

3d.—The order came too late on account of accidents to the messenger.

4th.—The artillery scouts sent in advance had not carefully examined the ground over which the approach was to be made. The pieces were consequently delayed by places difficult of crossing, or which possibly must be rendered passable by much time and labor.

5th. Forming into battery was faulty; for instance, the teams were taken from the pieces too soon, so that the pieces had to be moved considerable distances by hand, when much time would have been saved by moving further with the teams.

Such are some of the most common examples. We must confess that occasionally the delay was caused by a lack of mobility in the artillery itself, and this delay would be still more marked were the carriages loaded as they would be in time of war. But this delay cannot be ascribed to a too limited training of the draft horses or to defective instruction of the drivers. And we must consider in this connection that after the first losses of an engagement the number of horses trained in time of peace would be wonderfully reduced. The pieces would then be largely drawn by horses taken from the successive echelons or ammunition sections. As a logical conclusion from the principles advanced by "A," such a battery would be practically immovable, since its draft horses had not received the riding school training and the drivers would not be able to apply to them the artistic principles which they might have learned in the school for drivers.

Now, the experience of the campaign of 1870 has shown that batteries thus horsed are far from immovable, and we have faith to believe that the next campaign will give similar results. In 1870, great was the joy of the chief of section who obtained a section fitted out almost entirely with requisition horses; he was morally certain of never being left in the rear. We speak from experience in this matter.

Since then we have gone ahead, and the reserve, in peace, is made up of better horses than formerly. We believe, however, that the requisition horses can be joined to this without diminishing the mobility of the battery. What labor is too great for strong work horses and the truck horses accustomed to haul heavy loads over the slippery pavements of cities? Horses of this class have the advantage of being more sturdy than the average artillery horse, and it seems to me that it is about this point that the question must hinge.

We share "A's" opinion that the present remount system does not always give the artillery the most suitable horses; nevertheless we have often noticed in our cantonments horses rejected by the commission which we would have promptly accepted. It is probable that the explanation of this fact may be found in the rapid changes in young horses, even in a few months.

Our artillery horses are often accused of not being blooded enough. We do not approve of the use of highly blooded horses. Such horses waste their energy unnecessarily, are quickly fatigued and become restive if the first efforts meet with resistance. The ordinary marching gaits are the walk and trot, followed by an occasional dash of a few hundred yards at a gallop across the fields; this effort can be sustained quite as well, if not better, by horses of ordinary blood. Endurance at rapid gaits is not then a desideratum, except for that horse artillery which must accompany the rapid movements of cavalry.

Having said this much on the quality of the horses, let us return to the training. In this we will be well guided if we follow the ideas of the lamented General von Podbielski, Inspector General of Artillery. He who suppressed, to our great joy, the race course volts at a gallop of the wheel horses, was far sighted enough to recognize the incompatibility of all these refinements with the hardships of active service. In accordance with his ideas, we believe that everything should be made as simple as possible, as it would be used in case of war. The purely equestrian training for a draft horse does not agree with this need for simplicity. Consequently the idea of a school for drivers would seem a step backward, it does not fall within the limits of a period of instruction confined to two years.

We would be tempted to agree with the scheme for increasing the reserve in time of peace, as it would simplify mobilization, but we fear it is beyond the range of possibility.

In conclusion, the following are some general measures which could be easily adopted for increasing the mobility of the artillery, or, better, for assuring its arrival at the proper place at the proper time.

1st. Artillery must be placed as near the head of the column as its safety will permit.

2d. The decision to call the artillery to the front must be made in ample time. As a consequence, commanding officers of all arms should have a practical knowledge of the essential principles of artillery.

3d.—Artillery commanders should have more practice in conducting their arm over unknown country; with this object in view, a longer period should be devoted to the war manœuvres of field artillery which precede the regular Autumn manœuvres. This time should be especially utilized for the instruction of scouts.

5th.—For remounts, the purchasing commission should be composed of artillery officers, or, at least, artillery officers of high rank should be attached to the commissions. In this manner the artillery would obtain what was best suited for artillery work.

6th.—The training of the artillery draft horses should conform to the old methods, so that our pieces will not be drawn by riding-masters' horses, but by horses simply broken to the saddle.

(3) *Reply from "A."*—"B" has dodged the discussion. Everybody agrees upon those general causes which may delay the arrival of the artillery upon the firing line. What "A" proposed was to call attention to those conditions inherent in the artillery itself which affect its mobility. These conditions "B" has hardly touched upon, but relegates them to oblivion in a lump, maintaining in a general way that the artillery has sufficient mobility. Nevertheless he makes several statements even in this connection that seem quite open to dispute. This is especially so in relation to the unfitness of blooded horses for mounted artillery use, and the degree of riding school and driver's instruction that is proper for the artillery.

"A" is a champion of blooded horses; he shows by several examples the good results obtained by their energy, provided they are given some little special care. As for the invocation of the ideas of Gen. von Podbielski, it is not believed that he would be willing to authorize the use of his name as an authority for limiting the amount of training for the horses, or to belittle the importance of thorough instruction for the drivers. On the contrary he has often declared that the artillery needed better, and better trained horses, and if he has not pronounced directly in favor of a school for drivers, he has clearly stated that proper instruction in driving is the foundation of all drill and is the source from which perfection must arise.

(4) *Opinions of "C."*—"C" imagines that "A" must move in an atmosphere of idealisms; he admits the conclusions of "B," especially as to the services to be expected from the requisition horses.

As to the school for drivers, he advances the following ideas. At first view one is led to say: we have a cavalry school, why not a school for drivers? But let us think a moment. If driving is deprived of that one of its constituent elements which is within the domain of the cavalry school, horsemanship, there remains a very limited field of activity for such a special institution, unless we go outside of the requirements of actual warfare. Consequently, to legitimize a driver's school, we would be compelled to invent a lot of fancy evolutions, which would render us expert in acrobatics suited to the circus ring, but would tend to throw in the shade the sole object of it all—preparation for war.

"C" then remarks that one of the fundamental elements to be considered in the mobility of field artillery has barely been mentioned, viz.: weight of carriages. There is a more or less sharply defined relation between this weight and the strength of the teams at our disposal, and it would be absurd to discuss means for improving the mobility of the carriages if, at the same time, we impose weights above the permissible limit.

We must first discover what this weight should be, and for this must consider the horse, not as he is in time of peace, but as he would be after the fatigues caused by long marches, bivouacs and insufficient forage. According to "C," it would be following a false line of reasoning to endeavor to improve the training of the horses or instruction of the drivers, both of which have reached a degree of perfection quite compatible with a service of two years. The new improvements for the harness are only experiments; the true solution of the question lies in decreasing the weight of the material.

(5) *Opinions of "D."*—A fourth writer now takes a hand. He acknowledges the value of a school for drivers from a theoretical point of view, but does not believe that such an institution is required practically.

He shows by historical examples—batteries of the 5th and 16th Divisions, horse batteries of the VII. Corps at Spicheren; artillery of the III. Corps and artillery of the Guard at Vionville and Sedan—that endurance at rapid gaits is essential, notwithstanding the assertions of "B." He concludes by a dissertation upon the requisition horses and remount system.

II. DEPLOYMENT INTO BATTERY.

In a series of articles the writer favors the use of direct fire, with certain precautions as to cover; he criticises, on account of its complication, one of the methods of deployment laid down for the German batteries, that towards both wings, and discusses at some length the distribution of the carriages among the several echelons of the battery. From these articles we take the following concerning the column of sections (*colonne par pièce*).

The column of sections is undoubtedly the most easily handled formation of the battery, since it occupies the longest possible time. Recently this fact of the "longest possible time" has been considered from a new point of view, and has given cause for reflection. Every artilleryman felt a profound conviction that this formation was not admissible under the fire of the enemy, on account of its depth and consequent vulnerability, and could not even be used within the limit of range; its use could only be condoned in case of superior strength, and should be promptly abandoned on reaching the edge of the zone of danger. Now, on the contrary, it is actually claimed that the formation is a practical one, even under the enemy's fire, and that the reproach of great vulnerability is unfounded.

An open country calls for scattered formations, says the Infantry Regulations, art. 76, p. 115, and it is surprising that this principle, which was formerly admitted by the artillery, should now be ignored by that branch. The great efficiency of shrapnel fire in the direction of depth as well as the good target for concentration of fire caused by the column of sections are arguments directly opposed to this new point of view. The action of shrapnel as to depth can only be obviated by reducing the depth of the column, and the concentration of fire by spreading out the battery in a lateral direction. The battery or group moving deployed in line of battle compels the enemy to use the most difficult and complicated kind of fire, namely, that at a moving target; the shots go high and a majority of those short are thrown away. The column of sections, on the contrary, favors a much simpler method of fire. There are no longer either high or low shots. Errors arising from misjudging the distance disappear on account of the depth of the column, so that it is almost as vulnerable as a close formation. The effects of a fortunate shot become very serious. A horse down or a wheel broken in the road where it is impossible to turn around can stop the march of the entire column under a hot fire. And even if the carriages disabled can be gotten out of the column, each one so disabled during the march is sure to cause great delay and disorder. The slight distance at

which the column of sections is visible is an argument in favor of its use near the field of battle, but not under effective fire. The possibility of using this formation within the limit of range will depend upon circumstances, but it must not be forgotten that its use will ordinarily entail a deployment under fire.

III.—ARMAMENT, TACTICS AND ORGANIZATION OF THE ARTILLERY.

(*a*) *Mounted Artillery.*—For the past five years, says one writer, our field artillery has been placed under the control of the corps commanders, and during this time the work of the firing grounds and manœuvres has been devoted to smokeless powder; ideas as to the construction of a new fire-arm have become sharply defined and the new military code has increased the number of batteries without adopting any definite organization. This therefore seems an opportune moment for advancing a few general ideas regarding our future field artillery.

Armament.—As soon as the construction of a new field-piece was proposed, a conflict was provoked between power and mobility. It has been advanced as an axiom that during war and the period immediately following, power is always preferred, while mobility has the call during long years of peace. This is one of the legends which should be laid away with many others of the same class. Were it true, the weight of field-pieces would have been constantly increased, while just the opposite has always happened, and in place of 8 and 10 horse teams, that of 6 has been everywhere adopted, able to travel over all kinds of country at all gaits.

A matériel well fitted for all requirements was that used by the Germans in the campaign of 1870. Prussia was then in the lead in matters of armament, and had a number of remarkable specialists who were not driven by popular turbulence to adopt hasty solutions.

The weight was then 1570 kg. for the matériel of the 4, and 1835 kg. for that of the 6. The results of this campaign taught that the 6 was slightly too heavy and that the 4 had more mobility than was necessary. It is true that the configuration of the theatre of war was especially favorable and that the superiority of our cavalry was so great that the artillery had almost the security of peace times. When it was decided later to unify the calibres, it was proposed to adopt a weight between the 4 and 6, but nearer the latter. Nevertheless a piece was adopted weighing about 2000 kg. Although it has been generally considered that this is within the limit for mobility, we must give it as our opinion, after the experience of twenty years, that this limit has been exceeded. Fortunately for us, other nations have fallen into the same error. But this important fact must not be lost from view in the determination of the gun of the future, even though great improvements be made in carriages and harness and also in the breed of horses.

We have the same problem for both infantry and field artillery; how to produce the maximum effect in the minimum time. On account of the accuracy already attained in the artillery with single shots, the problem for the artillery is reduced to increasing the rapidity of fire. There were formerly two obstacles to this increase, smoke and recoil. To-day we have

smokeless powder and our firing brake limits the recoil to a great extent, though it is evident that a spade brake is needed under certain conditions. So long as the piece is not practically immovable during firing, certain classes of cover cannot be utilized and at the same time accuracy of fire preserved.

At first the importance of this new desideratum, rapidity of fire, was overestimated. One of the principal advocates of this increase, using a rapid-fire gun of small calibre, is a Frenchman, Gen. Langlois. The opposite extreme—as large calibre as possible with high initial velocity—has found numerous advocates in this journal. The truth is probably to be found between these extremes. The field-piece is, from its nature, a compromise. It is an endeavor to unite a number of opposing conditions in such a manner that the demands of tactics and technique will be satisfied so far as possible.

The principal points to be considered in settling upon a new field-gun are about as follows:—

The total weight should be less than that of the 6, model 64.

The fire should be as rapid as possible.

There should be a single calibre for all field artillery, as the gigantic proportions of modern armies demand simplicity, even at the price of a slight loss of efficiency in special cases.

Judging from military literature, there is a general tendency to admit that the field-piece of the future will not be a rapid-fire gun of small calibre, but a true field-piece, having a calibre approximating to our old 4, or about 80 mm., and that the fundamental principles of our old system—flat trajectory and wide dispersion of projectiles—will not be eliminated, but rather strengthened. Other points must be determined by the results of practice.

The following considerations apply to the field-piece of the future, which for brevity, we might as well call a rapid-fire gun. These considerations have already an actual value, for, since the adoption of smokeless powder, firing brake, double action fuse, single projectile and improvements in methods of pointing, the present system presents many features of that of the future.

Tactical Use.—Among the points to be considered regarding the tactical use of the rapid-fire gun are the following:

Against Artillery.—Each shot must be, as formerly, accurate and easy of observation; under these conditions the increase in rapidity should permit a greater effect to be produced in a less time.

Against Infantry.—The flatness of trajectory should assure the best results, even with slight defects in elevation and direction, and the fire at infantry in motion will be delivered under the most favorable conditions, on account of the rapidity of fire and mobility of the pieces.

Against Cavalry.—Independently of the greater facility for firing against a movable target, there will be more freedom of action, as up to 1000 metres the ground will be swept by the artillery as cleanly as by rifle fire. Furthermore, the power of utilizing cover of all kinds during firing allows positions to be taken up much nearer the enemy in spite of the improvements in small-arms. The writer then goes on to compare the future

artillery with that of 1870. The small losses of the artillery then as compared with the other arms proved that this arm, in spite of the improvements since 1866, did not always sufficiently prepare the attack and sometimes hesitated to properly support the final attack of the infantry. He speaks of the difficulty of controlling masses of artillery, which difficulty is increased by the use of smokeless powder. False conclusions should not be drawn from the successes of 1870 and the contempt for cover shown at that time, but the opposition offered by the enemy must be considered. These questions are far from being exhausted in spite of the many subtle theories that are enunciated. It is rash to claim that in an artillery combat the advantage will declare for one side or the other in a quarter of an hour. Some batteries will be able by good firing to make partial breaches in the enemy's line, but steps will at once be taken to remedy this local reverse. And even should the long range artillery conflict be going against one side, the intervention of infantry skilfully posted in advance and making good use of its fire may change the whole state of affairs. The artillery in position will often be called upon to fire over the infantry and possibly over other batteries, since artillery will probably be told off to accompany the infantry in advance.

Organization.—The Battery-Question of 4-gun Batteries. It has frequently been claimed that the introduction of rapid fire would result in diminishing the size of a battery from 6 to 4 guns. The reason given for this is that with four pieces there will be every facility for keeping up an uninterrupted fire from one flank to the other, and that the use of six pieces would give no advantage in this direction. The objection to this view is —as has already been shown in the new system of firing—that the full rapidity of fire of which a battery is susceptible can better be obtained by individual fire by piece than by successive fire from the flank. Also in case of loss or injury, the strength of so small a battery would be too much reduced. And if we were hardly satisfied with 20 batteries of six guns per army corps, 20 batteries of four guns would not supply the urgent demand for increased efficiency. For many reasons a diminution of the tactical unit should be avoided, and it should rather be made as large as possible. The same commander is easily able to watch and control the fire of a battery of six pieces, so we should adhere to that number.

The writer then makes some propositions in detail as to efficiency in time of peace and the distribution of the personnel of the battery.

Larger Combinations of Artillery.—The writer sharply criticises the present organization of the German artillery. He says: "While every German knows the organization of a cavalry or infantry regiment, hardly ten officers can be found who can state positively what is the organization of a regiment of field artillery. We have regiments of 8, 9, 10, 11, 12 and 13 batteries; of 3, 4 and 5 abtheilungs; and abtheilungs of 2, 3 and 4 batteries; it is a veritable kaleidoscope.

The greatest obstacle to a healthy organization during peace is the preservation of the corps artillery. The subordination of the artillery to the corps commanders in 1889 was one step in advance. To overcome inconveniences which arise every day, it is necessary to extend this still fur-

ther, and give control to the division commanders, who are called upon constantly to handle the arm in the field. This can not be done properly if the division into three parts, requisite to retain corps artillery, is maintained. Therefore the proposition is to abolish corps artillery. Experience teaches that such a body can be easily improvised from the other pieces if needed at any time.

Let the 20 batteries of the army corps be divided between the two divisions. From these the number of units required for a corps artillery could be detached when needed.

And the writer does not stop here with his subversive ideas; for him the group must cease to exist. He claims that neither the Artillery Regulations of 1889 nor of 1892 has defined the difference existing between the duties of the commander of the abtheilung and the regiment. For him the wording which gives the abtheilung commander the control of the fire from the technical point of view of the artillerist, and the regimental commander from a tactical point of view is devoid of sense. Consequently he proposes the following arrangement for the future. The ten batteries belonging to a division form a brigade of two regiments of five batteries each, these batteries not being in groups. The regimental commander will have an officer of rank to assist him in his duties.

These last propositions have aroused the criticisms of two new writers, who, while recognizing certain defects in the present organization, will not favor the suppression of the corps artillery or abtheilung. What would be the function of the assistant to the regimental commander? Would the latter give him the supervision of two batteries, reserving three for himself? If so, that would simply be a return to the present organization. How would the responsibility be divided and how would the renewal of the ammunition supply be assured?

They consider that the distinction in the Regulations between the technical and tactical control has a definite meaning, and they claim that if the abtheilung did not exist it would be necessary to invent it.

All agree about the superior control of the artillery and refer to the ideas of Gen. Langlois and extracts heretofore published from his works. "A chief of artillery," says this general, "should have the same faculty of taking in things at a glance as a chief of cavalry; he should know the tactics of the other arms and should take the initiative to assist them without waiting for orders."

And in conclusion they say:

"To encourage the artillery spirit, General Langlois demands an inspector general for the head of the field artillery, who would give an impetus to that branch similar to that given the German artillery by Gen. von Hindersin."

We must acknowledge that the tactical arrangement of the French artillery is planned on a very liberal scale, and the same ideas enter into the Russian system.

(b) *Horse Artillery.*—After a review of the history of German horse batteries, the following conclusions are drawn:

1870 has shown the necessity for horse batteries. Still there are differ-

ent opinions as to the number and use of these batteries. Some wish to confine them to the cavalry divisions while others would include them in the corps artillery. It is natural that the advocates of corps artillery should wish to see it enriched by these horse batteries. In this connection, the scheme proposed by Prince Hohenlohe is very logical. He fixes the artillery of an army corps at two divisional regiments of mounted artillery, and one regiment of horse artillery for corps artillery.

Armament.—The question of ammunition supply imposes a single calibre on all artillery. The rapid-fire gun of the future which shall be adopted by the artillery, will form the armament of the horse batteries also. Some differences in details will allow a diminution in weight, and the carriage can be more lightly constructed since the guns will not fire with so great angles of elevation.

Tactical Use.—The examples of the War of Secession, made use of by Prince Frederick Charles in 1870, show what can be accomplished by well trained horse artillery when used in connection with cavalry. The adoption of the rapid-fire gun will facilitate the combined action of these arms in the future. With this weapon, the artillery will be comparatively independent, and will cease to be a constant source of care to the cavalry commander. Able to look out for itself, it can be thrown forward with the advance guard and disperse the opposing cavalry with its rapid fire. It will assist in reconnaissances and will not be afraid to share in the mêlée. If the fight favors the enemy, it can be quickly withdrawn and as quickly replaced in battery. Several batteries placed as a crochet or in square cannot be captured by cavalry.

The old saying that beaten cavalry must entirely disappear from the battle-field the same day will be erased from among military proverbs.

These conclusions have not failed to arouse the opposition of several critics. One considers that artillery formed into square and firing in all directions would be a source of danger to its own cavalry. The same critic is rather sceptical as to a reconnaissance by cannon shots. He advocates the use of infantry on bicycles to support the artillery of the cavalry divisions.

ORGANIZATION—THE BATTERY.

The special conditions attaching to the use of horse artillery, point to the adoption of a four-gun battery. The battery must act with a rapidity equal to that of a squadron and the front of a six-gun battery is too much extended to be controlled by the voice during the tumult of a cavalry action.

Larger Groupings.—Twelve guns per cavalry division is generally admitted to be the minimum. Some wish to have twelve pieces divided into three batteries, while others recommend sixteen in four batteries. Some writers favor having the horse batteries grouped into regiments during peace for purposes of instruction. It is especially desired to see the four horse batteries of the Guard united into a regiment which would serve as a model for all horse artillery. Finally, all insist upon the great importance of developing accuracy of fire in the horse batteries; accuracy should not be sacrificed to mobility. Let us not, says one, fall into the error of the

cavalry commander who devoted the whole instruction of his regiment to the use of the oars of the folding boats attached to the cavalry service.

(To be continued.)

THE FUTURE OF THE ARMY MEDICAL STAFF.

By Brigade-Surgeon Lieut.-Colonel WILLIAM HILL-CLIMO, M. D., Army Medical Staff (Retired).

(From the United Service Magazine, London.)

"Tempora mutantur, nos et mutamur in illis."

IN the article entitled "Army Medical Organization," which appeared in the December, 1894, number of this Magazine, I drew attention to the cleavage which in recent years had taken place in the Army Medical Department; how, if I may say so, it had become divided into two rival schools or hostile camps—the professional and the military. I pointed out how the latter, consisting in the first instance chiefly of the younger generation of medical officers, had taken command of the craft, and I indicated in a general kind of way the causes which were at work, and which gave increasing force to this new departure. In the brief summary I made of them, I but touched the fringe of the question. I propose in this article to take a wider range, bringing together the discordant elements and conflicting circumstances which have produced results so unexpected, and so peculiar, *in the case of members of a profession whose raison d'etre has nothing in common with that of the profession of arms.* Afterwards, I shall consider how the altered relations of the department to the army thereby resulting affect the well-being of the soldier, and influence departmental efficiency. Finally, I shall endeavor to indicate the lines upon which the evolution of the department must be undertaken, if, while retaining its speciality, it is to keep pace with that progress everywhere apparent in military affairs. To reconcile these seemingly antagonistic positions, and to show how they can be made to work together in harmony, is the object of this article.

This subject has for me a special fascination. In 1871, I foresaw when the military reforms introduced by Lord Cardwell were about to be adopted that they would afford the opportunity of raising the question of the military status of medical officers. No doubt this movement in any case must have taken place, but it would not have taken place so promptly, nor would it have obtained so wide a support had not the abolition of the regimental system been looming in the near future, and had not the unification of the department been nigh at hand. It afforded, I say, the opportunity; for even antecedent to these events the department was ripening for this agitation, many of the causes conducing thereto being already in existence. I felt sure, therefore, that the first occasion which presented itself with any likelihood of success, would be availed of. It would have been as im-

possible to have prevented this agitation as it would have been to have stayed the current of some mighty river in its course to the sea. This was the time when, if the department had been wisely ruled, this movement might have been so controlled and directed that in the revolution of military affairs, which was then taking place, it would have emerged into a haven of security and content, and would have acquired the power to meet the new responsibilities which the introduction of station hospitals was about to impose upon it. Alas! this was not to be. The senior officers of the department were only too intent on their own personal ambitions, and allowed the struggle, which was laudable in itself, to degenerate into a scramble for military titles, thus placing the medical service in a false and undignified position, alike destructive to its best interests and to its usefulness. I say so, for I am well convinced that every act of competition for military advancement and title is fatal to professional progress.

I have held and expressed these views now for a number of years. They have not been manufactured to meet the course of events. I think I shall be able in the progress of this article to make this abundantly clear, also that I have not approached the subject in a flippant spirit, but after matured and constant thought. Let me explain. So far back as in 1889, before Lord Camperdown's Committee sat "to inquire into the pay, status, and conditions of service of medical officers in the army," I wrote the article on "Army Medical Organization," which appeared in the *Allahabad Pioneer* of the 11th of March, 1889. In that article, I gave a retrospective history of the Army Medical Service, tracing to their sources the causes of the discontent which at that time prevailed in the department, and I made certain recommendations for their removal. These recommendations were in the main identical with those subsequently submitted by Lord Camperdown's Committee to the Secretary of State for War, and which ultimately obtained official sanction. *Litera scripta manet.*

When this agitation first began, the best men in the department—by this I mean the ablest and hardest working—hoped that the evolution of the medical service would take place on professional rather than on military lines. It has not done so. Because I have persisted in still urging this view after other laborers in the same field have ceased to toil, or have thrown in their fortunes with the multitude, my opinions were recently pronounced by a professional journal as "not up to date." It does not say much for the profession of medicine when its leading journals, in advocating the claims of the army medical staff for military advancement, place their own profession in so secondary a position, and see in the most trivial circumstances evidences of slight and insult. For me, the profession of medicine takes first place. I desire no reflected glory from its service associations, no matter how honorable these may be. Nor do I consider the attempt to sail under two flags in anywise decorous. If military reward be given for professional merit, I accept it as a just tribute, but I object to its being used as a "betterment clause" for the medical profession, which must stand or fall on its own merits. The social advancement of the profession must be made by itself, and from within, and must not depend upon the accidental service associations of some of its members. The sooner

this truth strikes home the better. Hitherto it has been conspicuous by its absence.

I cannot leave this branch of the subject without some further remark, because the danger to which I call attention is not confined to the dealings of the medical profession with service grievances alone, but extends to its relations to society. This view is very ably discussed by Dr. J. Burney Yeo in the article, headed "Medicine and Society," which appeared in last December's number of the *Nineteenth Century*. He writes as follows: "In some recent discussions that have taken place in medical gatherings, and in medical journals, in connection with the subject of medical ethics, opinions and views have been expressed which have presented more the appearance of trades' union restrictions, and socialistic tendencies to 'level down' than a real desire for the social advancement of the medical profession." The idea running all through the article is that the endeavor of the medical profession is to coerce society to its views. This is my standpoint as regards the present relations of the medical profession to the army, and to the methods it has employed in espousing what it considers to be the grievances of the army medical staff. I trust before this article is closed I shall be able to prove that this style of warfare is an anachronism, and contains in itself the elements of defeat; but to do so I must return to the first part of my undertaking, namely, the investigation of the discordant elements and conflicting circumstances which had, as I have said elsewhere, the effect of making medical officers dissatisfied with their profession, and of leading them to look to military position and to military titles for social and other advancements.

What then were these elements and circumstances? I group them under five heads, namely, political, social, military, departmental, and professional. In the discussion of them which follows, I shall, for convenience' sake, and because their action and effects are so intermingled, investigate together the first and second, and for the same reasons I shall deal similarly with the third and fourth. At first sight perhaps it will be considered far fetched to associate agitation in a department with political and social movements outside it, and with which it may not have had much sympathy, but of the reality of this connection I have no doubt. To trace this connection it will be necessary to go back some thirty years in the history of the country. The political and social changes which were then taking place had at that time a strongly levelling-down tendency. The tocsin of privilege by prescription had sounded, the doctrine of universal brotherhood was preached, and the reign of equality had dawned. At the same time the diffusion of wealth had given to other and more aggressive classes in the commonwealth increased powers, which, if impotent to level up, were most potent to pull down and to destroy. It has been ever thus in the history of the world; the spirit of a new democracy is always guided by impulse, and is therefore in the first instance destructive. It is only by experience it gains wisdom, and learns the lesson that, though it is easy to destroy, and though the results are irrevocable, yet it is no nearer the goal of its ambitions, or that the advantages are not what it anticipated. It is the genius of the English people that they more quickly than any other

nation have realized the fact that destruction does not spell progress, but that advancement depends upon personal effort rather than upon political systems. It is this conservative instinct and the higher education of the people which have enabled them to detect and to expose the shams of the past decade. Every day that passes makes their exposure more complete, and the electorate more intolerant of pretences.

The Army Medical Department, as I have already said, was not slow to make use of these new political and social forces, and to turn them to its own advantage, aided and abetted as it was by a powerful associafion. It was quite right to do so, but most unfortunately the object it had in view was not professional progress, but military encroachment. That this line of action was ill-advised, and is so still, I have no doubt; for its authors failed to see, as they do still, the trend of military affairs. But of this later on.

It will simplify the discussion of the second set of causes if I arrange my remarks in chronological order. I propose, therefore, to consider the state of the army and of the medical service from 1860 up to the present time. For greater convenience I shall split up this period into three lesser periods, namely, from 1860 to 1870, from 1871 to 1881, and from 1882 onwards. The first period represents the old order of things; the second, that of unrest and of military reform; and the third, that of progressive development.

I have to begin with the Medical Department, because it was the first to feel the spirit of progress. It was in 1860 that the Army Medical School was established, and candidates for commissions were required to have a medical qualification, as well as a surgical diploma. These changes owed their existence to the lessons taught the nation by the Crimean War, and by its increasing knowledge of the health conditions of British troops in India. The medical disasters of the former, and the large mortality from preventable diseases caused by the latter, were notorious. These were wise measures, and fruitful of good results; but they would have been more so had not the older generation of medical officers, with whom all authority and power lay, been so wedded to the past, and so intolerant of counsel. How was it possible to expect otherwise when it was in consequence of the vices of the system under which these officers had been trained that the inception of these very measures was owing? There were bright exceptions to this rule, men, as it were, who were born before their time, or rather living in advance of it. How often I have heard them say "Our efforts are useless. Our work is killed by apathy or by obstruction." They were, so to speak, *rari nantes in gurgite vasto*.

During this time, the state of the army was much the same as it always had been. Its recruitment was for long service, and its officers obtained their commissions by purchase. It had not yet been discovered that the profession of arms required for its successful prosecution high culture and scientific training. It was but a pastime which the gilded youth of the day might enjoy for a season. In these circumstances it was natural that the young medical officer, who had arrived at his present position after years of study, should contrast his fortunes with those of the combatant officer. He felt it to be an insult to the democratic spirit of the age, that

money should be the means of bestowing military rank upon its possessor, and with it social precedence, while to him there was no prospect of professional advancement. What, therefore, was left for him but to turn to his military position as that which would bring him compensation? Though the condition of the army, at this time, was as I have stated, there were not wanting signs that a new era was about to dawn. The recent institution of the camp at Aldershot furnished a valuable experience, and was affording practical proof of the necessity of improved military training, and a more extended knowledge of military affairs generally. Much of the progress, which has since taken place, had its origin in the same idea. For this the late Prince Consort has deserved well of the nation, and when the history of army reform in this country is written, full justice will be done to his patriotism, and to his labors in this direction. A period followed pregnant with fatalities on the continent of Europe. The campaign in Germany of 1866 had spoken with no uncertain sound of the necessity of not only the leaders in the field being masters of the art of war, but that company commanders should share in this knowledge, so as to produce that combination of action, which alone, under the conditions of modern warfare, can secure victory. The experiences of the Franco-German War of 1870 71, thundered forth the same advice. The country which failed to act upon these warnings when next it exposed its fortunes to the arbitrament of war, only courted defeat and national disaster.

The second period, from 1871 to 1881, I have described as that of unrest and of reform. I might have added that it was one of discontent also. The consciousness of impending changes had previously existed. Its origin could be traced as I have already stated to social and to political causes, as well as to military necessities. In a service so saturated with *esprit de corps*, the very name of change was a bugbear. Besides, the army had deserved so well of the country in the past, that anxiety for its future was legitimate. It could hardly be expected to be otherwise. The training of the soldier, whether officer or man, fostered this contraction of view, and prevented that largeness of character, which would enable him to see in these innovations, the road to progress. Therefore, when short service became law, and when purchase was abolished in 1871, it was necesary to carry the latter through by royal warrant. This, too, was the age of invention in the production of weapons and munitions of war. In the same period, the unification of the Army Medical Department took place. Station hospitals were introduced, and the regimental system was abolished, while it was admitted that short service would increase the fighting force of the country, it was feared that what would be gained in quantity would be lost in quality. So, too, the most desponding views were taken of the abolition of purchase, and of the substitution for it of competitive examination, as the channel for obtaining commissions. Similarly, the linking of regiments together with territorial designations instead of by their old numbers, was considered opposed to their dearest traditions, and fatal to their *esprit de corps*. The outlook of the Army Medical Department, consequent upon these changes, was not so gloomy. All its previous history in the field proved the old regimental system to be rotten, and that there

could be no readiness for war with so antiquated an organization. If it was to be held responsible for its own work, it must stand or fall alone, and therefore it must be endowed with power adequate to its new obligations. All this is commonplace now, but it is necessary to recall these events because it was in these conflicting circumstances—in this uncertainty of the military future—that the department found its readiest ally. It is ever thus. One man's misfortune is another man's opportunity.

The third period has been one of continuous progressive military development. The year 1882 very pertinently serves as the starting point, because it was in that year the Egyptian campaign took place. Though only a very brief time had elapsed since the introduction of short service, yet it was sufficient to demonstrate its value. The success which attended the calling out of the Army Reserve men at that time heralded the present satisfactory condition of that force, when it can add 80,000 trained soldiers to the fighting strength of the army. The linked battalion system, with its territorial associations, has lived down all that was prophesied against it; rather it has increased the prestige of the Service, and has raised the soldier in public esteem. Of all these innovations, none has had more beneficial results than the substitution of competitive examination for purchase. There is no body of young men of the same age in the country so highly educated as the successful candidate for admission into the Royal Military Academy, Woolwich, and into the Royal Military College, Sandhurst. The professional training they undergo there, with its accompanying discipline at that period of life which is the most plastic and the most susceptible to those influences, which go to form character, teaches them the necessity of obedience to authority. To know how to command, it is first necessary to learn to obey. For the purpose I have in view, it is not necessary for me to go into other details. It will be sufficient to mention that during this period the improvements in the matériel of war, in army organization and administration, and in the augmentation of the military resources of the empire generally, have reached a high standard. The nation has not been slow to recognize, and to reward those officers in high positions who have initiated and carried out these great reforms.

The year 1882 opened with equal good promise for the Army Medical Department. Great progress, in recent years, had been made in medicine and surgery, and the boundaries of sanitary science were being largely extended. The reforms already mentioned as having been inaugurated during the second period were now in course of completion. The appointment, therefore, in that year of a new Director-General, believed to be able, and in sympathy with his officers, was hailed with acclamation, for it afforded the opportunity of these reforms being successfully put into practice. I do not recollect there being a single dissentient voice. It was not once, but often, this officer had expressed the opinion that the evolution of the medical service must be conducted on professional lines, so as to best advance the interests of its officers, and, at the same time, to give results most advantageous to the State. However the tenure of his appointment had hardly begun, when it became evident that he lacked the ability and the force of character necessary to carry through his original purpose.

The honesty of his intentions was never in dispute, but his ability was writ in sand. The circumstances of the time were too many for him. His initial mistake was that he had not made himself acquainted with the special qualifications of his senior officers. Consequently he failed to select the instruments best suited to carry out his policy. It is this want of knowledge on the part of its chief which always mars a department, for without it there can be no successful administration, and it is this faculty of selection which indicates a real leader of men.

Under these circumstances the Egyptian campaign took place, and officers high in command complained that medical officers failed in initiative, and to assume the responsibility which service in the field had imposed upon them since the unification of the department. Sufficient time has now elapsed to take a dispassionate view, and, without admitting all that was alleged, there can be no doubt that in many instances this complaint was well founded. But what of that? It would have been impossible to have expected anything else. It is always a dangerous operation to change horses midstream. Recollect that in this case the new order of things was not even thoroughly established when, without any previous training, senior medical officers, wedded to another system by more than a quarter of a century's service, were asked to throw over their experience of the past, and to trust entirely to their own resources. It was a large order.

I am not concerned with the further development of this subject, except in so far as it influenced the department, more especially the junior officers, in relation to regiments and to other departments. This influence was first made manifest in the junior officers, and from them it spread to the department generally. It naturally had this beginning, for these officers with higher professional attainments had expected better things from the reconstitution of the service. Doomed to disappointment, they saw in their profession no hope of progress, or of advancement, and, instead, sought for a more defined military position as that which would best secure their own interests, and fit them for the larger sphere in which they were now placed. While in this state of discontent, it was with an astonishment akin to dismay they learned that relative rank was abolished, and that they no longer had any military status. Hence arose the struggle for military titles pure and simple with substantive rank, and, paradoxical as it may appear, it was for the same reasons the department raised no objection to the degradation of their profession. I have already shown how this has occurred, but I will give one more instance. Quite recently the Indian subordinate medical service has been reorganized, and the time-honored title of apothecary has been abolished, that of surgeon, etc., being substituted. Not only are the titles of assistant-surgeon and surgeon, etc., etc., misleading, but I ask by what right has this change been effected? How is it that a title which ought only to be conferred by a royal college has been usurped by a subordinate service. I say the authorities who have done so have no legal right. It is entirely indefensible. Why was it done then? Is it to make medical officers still further disgusted with their medical designations, and to give them a greater claim for military titles alone? It can have no other effect.

"Ne sutor ultra crepidam." This quotation is pertinent to the discussion

of the fifth set of causes, or the professional, which, notwithstanding the concurrent advance of medical and surgical knowledge, have contributed more than anything else to this agitation. Indeed, without them it would have never taken place. These causes I have arranged under four heads. They are (1) the low standard of preliminary education, (2) the multiplicity of medical schools and of examining bodies, (3) the competition for petty and ill-paid civil appointments, and (4) the want of professional *esprit de corps*. These causes have had, and could have, only one result, namely, the social degradation of the profession as a body. Of course this does not apply to the leaders of the profession in their personal relations to society, but it does very materially affect them in public estimation, and in the treatment the profession always has received from the State as regards honors and rewards. The profession has never yet obtained the recognition it has deserved so far as relates to the work of its most distinguished members on behalf of the public.

It is not my province, in this article, to point out how these evils can be corrected. The way and the means are self-evident. Suffice it to say that this work, however distasteful it may be to medical schools and corporations, must be undertaken by the profession itself, and with such unanimity as to compel immediate and effective legislation. I say, once again, that no encroachment on the military or other public services will give the medical profession a better status. It must depend upon itself, and upon itself alone. I have already alluded to Dr. Burney Yeo's views on medical etiquette, as a lever to coerce society, and now I have to call attention to a further perverse development of the profession to secure its ends, which is to boycott the medical services of the State. Perhaps the profession would act more wisely if its journals ceased these threats, and confined themselves to more legitimate warfare. This is a game that can be carried a little too far, and so far as influencing the ultimate result, it is but emulating the labors of Sisyphus.

While writing the above there has appeared, in one of the leading medical journals, a criticism on the remarks recently made by the Adjutant-General, Sir Redvers Buller, G. C. B., when distributing the prizes at the Army Medical School, Netley. He ventured to observe that departments were most respected when most efficient, and that medical officers would be best esteemed according to the manner in which they discharged the duties of their profession. A very unobjectionable and common-sense view, one would think, to present to young officers joining the department, but not so received by this paper. It was lacking in sympathy with the aspirations of those members of the Army Medical Staff who want a "greater share in the work of the regular army." In the Garden of Eden it was the devil's spectacles Eve used, when she looked longingly on the tree of knowledge of good and evil. It is always so. Our power of vision is that of our desire or of our interest. I give this as an illustration of the spirit with which military affairs are treated by the medical profession, when they impinge upon its supposed interests. There could not have been a more inopportune time to suggest that the sphere of duty of medical officers should be extended—but of this presently.

The second part of my undertaking is to show how the altered relations of the department to the army, which have resulted from these new conditions, affect the well-being of the soldier, and influence departmental efficiency. I had intended to have limited myself to these two points, but the demand recently made by some members of the Army Medical Staff, for a "larger share in the work of the regular army," compels me to embrace this contention also. I would have preferred to have left it untouched, and to let it meet with the fate its recklessness deserves. This cannot be done. The experience of the past forbids it. It is a contingency—a force—that must be reckoned with, more especially as it is obtaining a veiled support from the profession, and as it is the outcome of existing tendencies in the department.

The well-being of the soldier, from a health point of view, and the efficiency of the Army Medical Department are inseparable. They are correlative. I shall therefore discuss them together. In the remarks I am about to make, I do not wish for a moment to convey the idea that I am raising the shadow of an objection to the unification of the department, to the existence of station hospitals, and to the endowment of the Army Medical Staff with power and authority, free and unfettered, and commensurate with the functions they have to perform. I am well aware that no other system will succeed, more especially as the whole tendency of the present time is to decentralize, and to fix responsibility upon departments and upon individuals. It is the faults, therefore, of the system to which I wish to draw attention. They are in no wise inherent, but have grown as excrescences to disfigure the original stock, and to impair its utility. These faults are: (*a*) the deprivation of corps of the continuous service of medical officers; and (*b*) the sacrifice of the medical to the military duties of the department.

In some articles which I have recently written, I have shown that there has been both medical and sanitary failure consequent upon regiments no longer having medical officers serving with them.* It will not be necessary, therefore, to repeat the facts and arguments. I am the more inclined to this course, because I have never yet heard from a single officer of experience—whether medical or combatant—a contrary opinion. All that has been alleged in opposition has been, that the present system could not be worked, and a medical officer appointed to each corps, without such an increase to the fixed establishment as would largely add to the medical vote. I dissent from this view. With certain modifications of organization, and of the terms of service, to which I have called attention in my article on army medical organization, already referred to, a medical officer might be appointed to do duty with every regiment without increasing, to any great extent, the cost of the medical service. Of this I am perfectly certain, if the country knew the real facts, no expense would stand in the way. Short service has rendered this difficult. With long service this necessity long since would have been made as clear as noonday.

Let me give this one more experience. In 1877 and 1878 I was Division Staff Surgeon at the headquarters of what is now called a first class mili-

* See *United Service Magazine*—numbers for April, July, September and October, 1895.

tary district in India. I was therefore the medical attendant of the general officer commanding, who was at that time suffering from a disease both obscure and serious. Indeed, so obscure was it that he himself was not conscious almost of its existence, much less of its grave import. That officer now, by the gratitude of this country, and by the favor of his sovereign, enjoys the highest military honors, and yet the page of history which merited these distinctions he could have never made had not this disease been detected in time. Now suppose this case occurred in a regiment under the present conditions of the medical service, the disease must have remained unrecognized until, through the hardships of field service, it had worked its fatal consequences. The conditions of the soldier's life away from family and friends renders it more difficult than in the case of civilians to get all the information which is necessary for the successful treatment of an illness. This treatment depends not only upon the accuracy of the diagnosis of the disease, but upon the knowledge of the moral, mental, and physical forces to combat it.

The sacrifice of the medical to the military duties of the department is an evil of no small magnitude, and it is a growing one. The whole tendency of the present time in the public service is to demand thoroughness of work with perfection of results; in other words, this is the age of specialism. This is no less true of military questions than of medical. It is this larger view which modern warfare and modern inventions have opened up to the profession of arms, which has made it necessary that its officers should possess more than average ability and education, and afterwards that they should make the problems of war their constant study. Formerly the study of military details was irksome, not so now, for, illumined by this greater light, these details are seen to form part of a large system which helps the scientific soldier to the attainment of this higher knowledge. "Can the military details which medical officers are responsible for in quarters or in the field have a like effect upon them?" Most certainly not. Look at the subject from all sides. Separate these details from the professional duties of medical officers. Turn and twist them how you will their place is a secondary one. Again view the question in the light of the rank of medical officers. By this I mean the rank commensurate with the performance of certain specified duties. Well, I unhesitatingly affirm that there is no position an executive medical officer holds, so far as military duties only are concerned, which demands higher military rank than that of major. Therefore the claim that because of their military duties medical officers require high rank is absurd. It is a very doubtful asset in the ledger of the department, and not to be traded upon unless, indeed, the department had other securities to fall back upon. Well, thank Heaven, it has these securities. They are furnished by its profession, and by its profession only. They are more than sufficient to cover all military risks. If the department will only take this lesson to heart its materialand other interests will not suffer.

The piling up of the responsibility for military details on executive medical officers in charge of station hospitals, and doing duty, but more especially on the former, impairs the efficiency of the department to an ex-

tent greater than without actual experience could be believed. It is their pettiness which gives them so much importance, and it is this too which makes me refrain from giving examples, but their name is legion. They occupy so much time also that officers so employed cannot possibly bring to the solution of professional questions that freshness and keenness of intellect which alone can insure their being adequately dealt with. Surely it must be within the limits of military and medical administration to afford the necessary relief.

I have stated that the demand recently made by some few members of the Army Medical Staff for "a larger share in the work of the army," and which has been sympathetically mentioned in some medical papers, is the result of forces now at work which cannot be ignored simply because of its extravagance. The whole history of the department forbids it. Some limit must be put to these pretensions. The time has come, therefore, to view this question dispassionately. While advocating for the Army Medical Department full power to settle the affairs of its own household, and for the care of the sick and wounded, and within certain limits for all sanitary questions also, I am of opinion that outside this sphere it should have no authority in military affairs.

It is clear that the department cannot possess the special knowledge. Besides, the age at which medical officers join the service (the average age is about twenty-four years) is too old to learn discipline. Moreover, the whole of their previous training is dead against it. I have said the present time was singularly inopportune to have raised this question. What an object lesson to this end has been the recent raid into the Transvaal. I say nothing against the bravery of the leader. Of the simplicity of character and of the disinterestedness of Dr. Jameson there appears to be no doubt, but I venture to observe that no officer who had entered the army by any of the present avenues for a commission as a combatant officer, and who had risen to the rank of major, would have made so gross a military miscalculation of his own strength, and of the forces he would have to meet, and would have so grievously failed in discipline—in obedience to lawful authority.

Before entering upon the final portion of my undertaking I am desirous of making some further observations on the rank and titles question. I am the more concerned to do so because I believe I have not stated the strongest argument that can be advanced in favor of military titles, and it is only fair that I should do so. As regards rank I do not think there is any existing complaint, or, if there is, that it is a reasonable one. On the other hand, for military titles pure and simple there is more than a hankering. Well, the argument is that if medical officers had these titles they would not only obtain more social consideration but that their position would be more assured in their official relations, that a cause of friction between them and other officers would be removed and that their representations would be more considerately treated—in a word, it would not be thrown back upon them as a mark of inferiority that this is only a doctor's business. The social aspect of the case may be very well omitted, because it would be impossible for the services of the State to add to their responsi-

bilities the settlement of such questions: moreover, they generally right themselves.

I am of opinion that this feeling had its origin in military jealousy, and in an over-sensitiveness of the department. Both, to a certain extent, were justifiable; the military jealousy more because medical officers had high rates of pay and of pension. If, therefore, military titles were granted to them, combatant officers naturally ask, *what have we left?* The whole of this article is a living proof of how the over-sensitiveness of the department has been produced and how it is still fostered. I think, in the progress of military affairs, much of this jealousy has died, and in the general appreciation of medical science, which is now taking place, this over-sensitiveness will disappear also.

So far as this article is concerned it is only necessary for me now to submit my proposal. I shall do so only in outline. In the limits at my disposal it is not possible for me to give details. My proposal then is that the recruitment of the Army Medical Staff should be undertaken before professional education has begun, a certain standard of knowledge, embracing classics, modern languages, mathematics, and literature, being fixed; this examination to be undertaken between the ages of sixteen and eighteen years. After which the successful candidates should undergo their professional education at some selected schools or colleges. That during this time they should go through a course of company drill, either by being attached to a corps during the holidays or by belonging to the Volunteer force. That, after qualification in medicine, surgery, and public health, the choice of officers for the department should be determined by competition. I recollect the late Sir William Muir, K. C. B., when director-general, saying he did not want to know the medical schools his officers studied at, but tell him the school the candidate came from where he spent his boyhood. For the importance of this early school life cannot be exaggerated. It is it which broadens character more than all after experience. In this sense the military training I have recommended would be invaluable and develop that sense of discipline which, under present circumstances, can never exist. There would be no difficulty in obtaining a sufficient number of suitable candidates; rather, the difficulty would be one of excess, and the question of cost need not be considered for the candidates would gladly undertake it until qualified. Such, in brief, is the scheme I propose. I do so because I believe it affords that solution of the question which will make a contented and efficient service, and will best secure the well-being of the soldier.

THE GERMAN, FRENCH, AND RUSSIAN SYSTEMS OF INFANTRY ATTACK AND DEFENSE.

A COMPARISON OF THE EXISTING REGULATIONS.

Translated from the *Deutsche Heeres Zeitung*, by CAPTAIN P. HOLLAND, 51H PUNJAB INFANTRY.

Commmunicated by the A. Q. M. General Intelligence Branch.

(*From the Journal of the United Service Institution of India.*)

ALL the regulations for the field training of the German, Russian, and French infantry are based on the experiences of the Franco-German and Russo-Turkish campaigns, and although permeated in the main by the same essential principle, the various individual problems of the fight are solved in different ways.

At the conclusion of the Turkish war, the Russians did their utmost to improve the existing "Army Regulations," which were frankly acknowledged to be faulty. The movement resulted in the issue of the Infantry Regulations of 1881. These were gradually altered and enlarged up to the time of the last issue in June, 1893.

In the year 1894, after several provisional issues had appeared in 1875 and 1883, the new French drill book appeared in five parts (4 books) and except for a few modifications made in 1894, this is still the standard official book. This was followed in 1888 by the German drill book, which, with the exception of a few changes introduced in the 1889 edition, is still the regulation book.

In all three cases the smallest infantry unit is the company, with a strength varying between 200 and 250 rifles. Similarly, in all three cases, the double rank formation is adopted.

In the German army the distance between ranks is 64 cm. (about 25½ inches), in the French army 50 cm. (about 20 inches), but in the Russian army the distance of the rear rank man is a full arm's length from the edge of the knapsack of the front rank man.

In the French formation, on the other hand, the smallest distance between files is about 15 cm. (nearly 6 inches), in the Russian formation somewhat closer, 10 cm. (nearly 4 inches), and in the German army shoulder to shoulder.

In the Russian and German armies, the supernumerary rank is 2 paces from the rear rank, and in the French army 4 paces.

The German company is divided into 3 sections* commanded each by a lieutenant, these are again divided into half-sections (half-zug), of at least 8 files and sub-sections or groups (German "Sektionen") of from 4 to 6 files. The Russian company is divided into two half companies of two sections each (Zug). These sections are composed of 16 or more files, and are divided into 4 sub-sections (Sektionen) or when under strength into 2 sub-sections. The number of files in the latter varies between 4 and 8. The

* The word used is "Zug" which is very broadly employed in German. It might be more advisable to use the word "division" here as the word "Sektion" follows shortly afterwards.

uneven sections (Zug) are commanded by the two senior lieutenants who are also company commanders, and the even numbers by the next senior officers.

The French company, similarly to the Russian, consists of 2 half companies called "pelotons."* These are again composed of 2 sections (Fr. sections) the section containing 2 "demi-sections" or half sections; the half division has 2 "escouades," or groups, and the "escouade" consists of from 4 to 6 files as in the German army. The 4 sections are commanded according to their numbers by the senior lieutenant, the reserve officer, the adjutant (a non-commissioned officer),† and the "sous lieutenant" or sub-lieutenant. The half-sections are commanded by sergeants, the wings of the half-section having corporals in the front rank. In each group there are specially trained men employed as "éclaireurs," or scouts for reconnaissance purposes, this fact being noted in their discharge certificates with a view to their later employment. The soldiers of the 1st class correspond to the German‡ "gefreiten."

The German "company column," with a depth between sections (Zug) of 7 paces, corresponds to the Russian "double-section column" in two echelons ("Staffeln"), and the "section column" in 4 echelons (Staffeln) with a distance of 5 paces.

The French "colonne de compagnie" corresponds to the above, the distance between sections being 6 paces.

All marching formations in the Russian army are similar to those in the German, but the former have also a "double rank column" which is formed by the even or uneven numbers coming up, giving a total breadth of 4 men. The French have something very similar to this in their "formation par le flanc," in 4, 6, and 8 ranks. The German "section-column" (sektions-kolonier) is however unknown.

In the German army, the length of pace is 80 cm. (about 31½ inches) that of the French 75 cm. (about 29½ inches) and that of the Russians only 71 cm. (about 28 inches).

The German rate of marching is 114, the Russian 116-120, the French 128 paces to the minute, giving a rate of 91 metres (100 yards) 82-85 metres (90 yards) and 96 metres (104 yards) respectively. At the double we find matters reversed, the Russian covering 181-192 metres (196 208 yards) the Germans 165-170 metres (175-184 yards) and the French 136-144 metres (148 156 yards) per minute.

The battalion in all 3 armies is composed of 4 companies under one command.

A regiment both in the Russian and German army consists of 4 battalions, in the French only 3 battalions.

A "normal" brigade is in all 3 armies composed of 2 regiments.

The main ideas of an attack formation are practically analogous in the three armies, the principles being roughly as follows:

* The origin of our word "Pultan."

† German, "Unter-offiziers—charge"—*lit.* rank of under officer.

‡ Lance corporals or men exempt from guard-mounting.

(*a.*) Whenever possible a flank as well as a frontal attack should be carried out.

(*b.*) Development of a sufficiently strong firing line at the right moment.

(*c.*) All available fire to be concentrated on the defenders at effective distances, every advantage being taken of the ground over which the advance is made.

(*d.*) As soon as firing has commenced, the line to be reinforced as required, the advance being carried out gradually, and every effort made to gain preponderance of fire.

(*e.*) Reserve to be kept as far as possible out of range of the enemy's fire from the commencement, but to be gradually and steadily advanced, until they are eventually brought up rapidly into the firing line, when the whole will advance to the assault.

(*f.*) This must be followed up by fire brought to bear upon the retreating enemy, the reconcentration of troops, the pursuit being then carried out either by patrols or whole corps as may be directed.

The actual system of attack differs in some details in the various armies.

No "normal attack" is recognized by the Germans, the outline merely being given, and the rest being left to the discretion of commanders, the guiding principle being that a well delivered and determined attack insures success.

The following are the most characteristic points in the German attack:

1. Unless ordered to the contrary, skirmishers extend at a distance of ½ paces between files. The frontage occupied by a company in the fighting line will, however, not exceed 100 metres (108 yards) as the extension of entire companies is generally delayed until the last stages of the attack.

2. At the commencement of the attack not more than ¾ of the whole will as a rule be extended and not less than ¼ for the reserve. This is, however, not a hard and fast rule.

3. The distance of units in rear of the fighting line varies according to requirements from 200 metres (219 yards) upwards.

4. Skirmishers are only to double over open ground and when the enemy's fire renders it necessary.

5. On reaching the zone of effective fire, troops in close formation form single rank, but there is no rule laid down as regards the interval between files.

6. On the signal "alert" denoting the approach of cavalry, the square formation is only adopted when the infantry have been demoralized, and ammunition is running out, or when retiring over open country, they are constantly being harassed by large bodies of cavalry.

7. There are two kinds of fire employed according to the regulations, viz.: "volleys" and "independent."* The former are employed usually at the commencement of the attack when the firing line is not within effective range of the enemy's fire. Volleys are therefore the exception, and not the rule.

8. At the closer ranges and up to 600 metres (650 yards) everything is

* The Geman Schutzenfencer—*lit.* skirmishers or marksmen's fire.

aimed at, at the medium ranges and up to 1000 metres (1080 yards) at high and wide objects, and only exceptionally at the long ranges over 1000 metres (1080 yards) at large and deep formations. From 800 metres (866 yards) upward when the range cannot be approximately fixed, 2 sight vanes 100 metres (10 yards) apart are used.

9. Rapid firing is as a rule only employed when within 350 metres (380 yards) of the position, but in exceptional cases it may be used effectively up to 1000 metres (1080 yards).

10. Firing "on the move" seldom has any effect, and is therefore scarcely ever employed, except when perhaps a skirmishing line is retiring and is hard pressed by the enemy. Similarly long range indirect fire is seldom employed. Such are the complete details of the attack as laid down, innovations being strictly prohibited by the regulations.

The Russian regulations on the contrary prescribe for every detail of the development of the attack, and of the assumption of the "offensive" for a company, battalion, regiment and brigade. The normal Russian attack is carried out on the following lines:

(*a.*) The advance is commenced before entering the zone of the enemy's artillery fire, even at a distance of some 4 versts (4600 yards) all details having been previously arranged as regards extension of skirmishers, reserve, etc.

(*b.*) The advance on the enemy's position (which is assumed as a rule to be intrenched) is thus cautiously carried on from here to about two versts (2300 yards). Here a halt is made still out of range of the enemy's fire, when the battalions (as a rule 2) intended for the fighting line are formed into companies "in close formation." The latter are then formed into double sectional, or sectional columns at an interval of 120 paces and a depth of 150 paces.

(*c.*) This formation having been completed, 3 patrols (of ¾ men each) are usually pushed out from the 4 most advanced companies, to the front and flanks to a distance of 3500 paces.

(*d.*) Under cover of these patrols the advance is resumed up to about 2000 paces (1500 yards) from the enemy's position, the advance guard "falling back and resuming their place in their own companies."

(*e.*) At this point the four companies of the "first line" extend a chain of skirmishers, usually two sections, the advance patrols closing in on them on the march. The advance is then made along the whole front at a steady pace (each company having a frontage of 250 paces) up to the zone of effective infantry fire (for about 800 paces).

(*f.*) The "company reserve"* (two sections each) follow at a distance varying according to the nature of the ground, in open country at 500 paces.

(*g.*) The "battalion reserve" (two companies each) with the full interval (from centre to centre 250 paces) follows the "company reserve" at the same distance, forming together with the latter and the firing line the "1st line." The "2d line" consists of the 3d and 4th battalions of the regiment, and follows at the same distance.

* Corresponding to our "supports."

(*h.*) Finally, the last unit, consisting of the whole of the 2d regiment with its battalions massed, acts as the "brigade reserve." Its position is left entirely to the discretion of the brigadier.

(*i.*) When closer contact with the enemy has been attained, at about 800 paces, the skirmishers advance by rushes to about 150-300 paces from the enemy's position, being reinforced as required.

(*k.*) At this point the greatest possible amount of fire is concentrated on the position, and then either the skirmishers (alone, or in combination with the company reserves which have been meanwhile brought close up) advance to the assault. The attack may be eventually pushed home by reinforcements from the "battalion reserves."

The fighting line (*lit.* line immediately in front of the "company reserves") keep up a continuous fire during the advance to the assault. When about 50 paces from the enemy's position they advance at the double, the whole line throwing itself upon the enemy, shouting "Ura!" (Hoorah!)

(*l.*) In the event of the assault being successful, the pursuit is commenced at once, but if repulsed, the retirement is covered by the reserve.

The following are the particular points characterizing the Russian attack formation:

1. The interval between skirmishers in the front line is 2 paces.

2. Companies of 200 rifles formed for attack are expected to occupy a frontage 250 paces. It must therefore be very difficult for the company commander to control this long line and to maintain the requisite concentration of fire on the occurrence of casualties.

3. The extension of entire companies into skirmishing lines is, as with the Germans, delayed as long as possible.

4. In detailing units for the attack, it is laid down that the general reserve should consist usually of not more than one-half of the available force. In the German regulations, on the other hand, it is laid down that with a brigade of two regiments the brigadier must have at his disposal a reserve of at least one battalion or one-sixth of the whole.

5. Under normal conditions and in open ground, the reserve and other troops in rear follow at a distance of 500 paces, showing very decided principles as regards the depth of formation. This distance is decreased as the advance progresses, it being imperative to have both "company" and "battalion reserve" closer up as the enemy's position is approached by the firing line.

6. From 800 paces onwards, the firing line and reserves always advance by rushes of 100 paces, the reserves being preferably in single rank with one pace between files. They are, however, closed again during the assault, just before the final rush. If time permits, intrenching tools are used, the Russian infantry being equipped with the spade, as in the German army.

7. On the signal "the whole" (*das Ganze*) being given, denoting the presence of the enemy's cavalry in the neighborhood, no particular formation is prescribed, volleys being chiefly employed to repulse an attack.

8. In the Russian attack, volleys are principally employed, close formations firing nothing else. Up to 600 paces small objects are fired at, up to

800 paces aim is taken at cavalry,* and at ranges beyond 800 paces only at large formations. Nothing is laid down as regards firing without word of command.

9. The new Russian "three-line" rifle, Model 91 (7,629 millimetres calibre), has a so-called "fixed sight,"† with which all aim is taken up to 800 paces. 400 paces is the "point blank"‡ range, the sight here used being something between the German block sight (or "fixed sight")* and the small leaf. From 4 to 800 paces aim has to be taken above the objects, which is a distinct drawback. At longer ranges, the sight is adjusted to requirements, aim being invariably taken at the bottom of the object. Simultaneous firing with two or more sights is not practiced by the Russian infantry. Rapid firing "on the move" is employed during the last stage of the attack, *i. e.*, from the last advance to the assault, and also when retiring after an unsuccessful assault. This corresponds to the German "Schutzen in die intervalle" system, which has been eliminated from the new regulations, it being extremely doubtful whether such firing is of any value at all. "Indirect" or "unaimed" fire is employed both in "volley" and independent firing at ranges beyond 1000 paces, and on objects under cover. It is, however, acknowledged to be of very little value.

Up to the year 1894 the French had a "normal attack" similar to that of the Russians, and in the latter portions of the regulations, there were five "plans" giving the system of attack for a regiment, brigade and divisions. Although these reappeared in the new issue of 1895, a note, dated 15th April, 1894, had entirely cancelled them.

The system is precisely similar to the Germans:—

"Seule l'offensive permet d'obtenir des resultats decisifs."

For the actual carrying out of the attack, there are no "instructions" but merely "indications" or "general lines" subject to variations at the discretion of the commander, according to circumstances. There are, however, distinct regulations as regards the duties of individual units on the parade-ground, so that a new system has to a certain extent replaced that which was cancelled.

The attack of an independent regiment, for example, is thus detailed:—

1. The regiment forms in 3 lines (lignes) of one battalion each.

2. The 1st line only carries out the frontal attack, the 2d line secures the flanks, supports the 1st line, pushes on the attack should the 1st line be weakened, and renews the attack in the event of the 1st line wavering.

The 3d line (ligne de manœuvre) carries out flank attacks under the immediate orders of the commander, and also meets and resists any flank attack attempted by the enemy. It also supports the attack, participates in the pursuit or covers the retreat, and secures the latter by throwing up hasty intrenchments. The latter would appear to be a measure somewhat difficult of accomplishment, during the confusion of the fight!

3. The extent of front covered by a regiment acting independently does not usually exceed 700 metres (about 760 yards).

* The German expression used here is "Cavalleriezielle unter feuer genomenew."
* German "Standvisir."
* German "Kernschuss."

4. The distance between the lines varies between 3 and 600 metres (325 and 650 yards.)

5. Should there be no fixed point of direction, or should such be temporarily lost to view, compasses are employed. Besides officers, under-officers* and even a few corporals should invariably be trained in the use of a compass.

6. When carrying out a frontal attack in open country, the following are the details required from the battalion of the "1st line."

(*a.*) The commander gives all his orders, if possible in the presence of all the officers. He sends out as many† "éclaireurs" as he thinks necessary under an officer. Since the introduction of smokeless powder the task of the latter will be no easy one. He will have to reconnoitre the ground and the enemy, drive back the enemy's patrols, and by a discreet employment of fire enable the companies of the "fighting line" to come up into position. These parties should conceal themselves about 1000 yards from the enemy, sending back constantly any news of importance to the battalion commander, as regards the enemy or country.

The Germans have to a certain extent adopted this method, and Freiheer von der Goltz is a warm supporter of it. No attempt has, however, been made to follow up the idea, and very rightly so.

(*b.*) As soon as the "éclaireurs" are 500 metres (540 yards) in advance of the battalion (during which time all mounted officers will have dismounted) the companies of the "front line" (as a rule 2) with an interval of about 30 metres (40 yards) the companies of the "Réserve de Battalion" following at a distance of 400-500 metres (about 425-550 yards).

(*c.*) At about 1300 metres (1400 yards) from the enemy's position, the front companies extend either by files at one pace or more, or merely form single rank. Direction and dressing are by the centre, the distance between sections‡ being a few paces.

(*d.*) Having reached the "éclaireurs," the companies form the firing line in single rank, and the "éclaireurs" having closed in they advance until firing commences. The reserve companies now diminish their distance to 300 metres (325 yards) covering the flank of the front companies.

(*e.*) The "ligne de combat" fire as a rule "section" and sometimes "peloton" volleys, the advance being made by companies alternately until about 500 metres (540 yards) from the enemy.

(*f.*) At this point the firing line must receive considerable reinforcements. Both the companies hitherto in rear, therefore join the firing line, and carry it forward to about 400 metres (430 yards) from the enemy, the battalion of the 2d line now acting as a reserve to the 1st.

(*g.*) The 1st line now fixes bayonets, rapid fire is commenced, and the advance is made by alternate rushes with rapid firing for about 150-200 metres (160-200 yards).

(*h.*) Officers now give the word of command for "magazine fire" which has up till now been scrupulously spared. The battalion of the 2d line is

* "Sous-officiers."

† Scouts.

‡ Zug.

meanwhile brought close up as a support, and the whole of the 1st line is now hurled upon the enemy's position on the word "En avant!" "A la baionette!"

(*i.*) A successful assault is immediately followed up by the pursuit. If checked, fire is recommenced preparatory to the assault being renewed "Avec la plus grande energie" (a somewhat exorbitant demand to make on the troops unless there are sufficient fresh reserves in hand).

In order to gain a thorough comprehension of the above "general idea," the following observations may be of value:—

The "Tirailleurs," who originated in France and who upset the whole of "line tactics" a hundred years ago, are now disowned in the French Regulations. No "line of skirmishers" exists as such, the whole firing line advancing shoulder to shoulder, unless intervals are expressly ordered. The whole frontage of a company of 240 rifles when extended amounts therefore to about 150 metres (160 yards). The other companies intended to be employed in the front line have no "soutien," but are pushed up just as they are, complete.

As regards formation for attack, it is laid down both for a regiment and brigade, that when "en cadre" they are formed in 2 or 3 lines, when "isolé," always in 3 lines.

The fighting line advance by rushes ("par bonds successifs") from 400 metres (430 yards) onwards, the reserve maintaining such formation as is best adapted to the nature of the ground for the time being.

The supporting body from the 2d line, employed to push home the assault, is not brought up in line as the German and Russian attack, but in column.

Volley firing is employed against the enemy's cavalry. Should an attack be made on both flanks, a company column forms a "colonne contre la cavalrie" corresponding to the German "carrée."

Volleys are preferred by the French, though not to such an extent as in the Russian army. They are fixed as long as possible by "sections,"* and sometimes by "peloton,"† and are said to be effective at the following ranges:

Up to 800 metres (870 yards) or about the breadth of one group, up to 1000 metres (1080 yards), or about that of a "half section," ‡ up to 1200 metres (1300 yards) on that of a "section "§ of infantry or section of artillery, up to 1500 metres (1600 yards) on extended formation, double section and company columns, against cavalry and artillery, up to 2000 metres (2200 yards) against columns in marching formation and massed bodies.

This shows that the French allow a far greater spread to long range firing than the Germans, the reason being primarily their preference for volley firing. It is doubtful, however, whether volley firing to this extent could be even satisfactory, at the intermediate ranges; indeed it would be almost impossible in the face of an enterprising enemy. As moreover it is

* Zug.
†Half companies.
‡ Halbzug.
§ Zug.

essential to obtain superiority of fire at the medium or if possible at the long ranges, volley firing, as the principal kind of fire employed, scarcely fulfils the desired object.

At the end of 1870, volleys were employed by the Germans, and were adopted in their field training on the system advocated by the "Bavarian" Captain Mieg, but for the above reasons they were discontinued, far more value being placed on "individual" and "independent firing,"* especially at decisive ranges.

In meeting an enemy, therefore, that preferably adopts volleys, be it either the Russian or the French, the great object should be to carry the attack rapidly and vigorously forward beyond the zone of long range fire, and up to the medium ranges.

At close ranges when volleys are almost impossible, and the patrols and éclaireurs have come in, the French substitute "independent firing" (feu á volonté), but there is no alternate firing by men of one file as in the German army. This "independent firing" is vigorously maintained and is soon succeeded by "feu rapide," when the men fix bayonets, firing as many as 12 rounds per minute.

The greatest rapidity of fire is of course obtained by the use of the magazine ("feu a repetition"), which is, however, only had recourse to at the supreme moment, and then only on the word of command from officers.

Firing without orders is limited as follows:

Fire is (*a*) against an enemy under good cover at 200 metres (220 yards), *b*) against men standing or kneeling at 300 metres (325 yards), (*c*) against single horsemen at 450 metres (490 yards), (*d*) a group of at least 4 men at 600 metres (650 yards).

Such rules must, however, be extremely difficult to maintain, and display an unmistakable confession of distrust as regards the individual capabilities of the men. The system adopted in the German army is far simpler. With them, when within 600 metres (650 yards) aim may (not must) be taken at everything visible, between 600 and 1000 metres (650 and 1080 yards) aim is only taken at high and broad objects, while beyond 1000 metres no firing takes place as a rule.

The "Lebel rifle" ("fusil modele 86-93") has like the German rifle a point blank range, with a block sight at 250 metres (270 yards). Their sighting is indeed preferable to the German system, as they do not raise the back sight up till 800 metres (860 yards), whereas the latter raise the leaf at from 450–500 metres (490-540 yards. As with the Germans, anything up to 600 metres (650 yards) is included under the heading "close ranges," but the medium ranges on the French system extend to 1200 metres (1300 yards), while those of Germans are limited to 1000 metres (1080 yards. Sights are adjusted as required and firing commences on the word "raise sight" (Ziel aufsetzen). Beyond 1000 metres (1080 yards) 2 separate sights with 200 metres (220 yards) difference are used. This system is also adopted by the Germans, but only with at least one section. Nothing is laid down in the regulations as regards firing on the move or indirect fire, both of which may safely be dispensed with.

* German Schützenfeuer.

"THE DEFENSE."

The main principles of the defense are also almost analogous in the three armies, the chief maxim being that the position chosen should be that which naturally, and assisted by artificial defenses, enables the strongest and most effective fire to be delivered, and gives the best available cover to reserves in rear, and as a rule on a flank.

The "offensive" is also provided for on the same general lines, though somewhat differently carried out in detail.

According to the German regulations, a "defensive" which hopes for success, must be combined with a system of "attack."

The position and formation of the troops available is so arranged that local defenses are held with a small force, and that sufficient reserve is at hand for the defense of the flank and to assume an energetic "offensive" on some special objective when an opportunity presents itself.

In the French army much more importance is attached to this latter point, the regulations running as follows: L'hypothèse d'une défense passive est repoussé absolument.

Whenever possible, therefore, small "contre attaques" (counter-attacks) should be carried out by a portion of the "Reserves," from the front of the position. These may sometimes resolve themselves into a general "offensive" action. The defense should otherwise be always maintained à outrance.

The Russians apparently trouble themselves but little comparatively, as regards the offensive in the defense, the regulation merely observing that a counter-attack should be made when the assailants have almost reached the very position itself, and have pushed right beyond the skirmishers and supports with the bayonet. Fresh reserve troops are not called upon to assume "the offensive" until the assault has been repulsed without any prospect of it being renewed. This looks as if the Russians had to a certain extent abandoned their belief in the bayonet, although the latter had been looked upon as the national weapon since the days of Marshal Suwaroff, and is at the present time regarded by the fanatics as invincible.

Then again we find that the Russian regulations, in spite of being so far-reaching and comprehensive, do not even point out the importance of obtaining superiority of fire. There appears, moreover, to be a doubt as to whether the bullet or the bayonet is most to be relied upon, the result being that half measures are advocated, which are certainly not conducive to the full efficiency of either being obtained.

The weak points of the Russian attack seem to lie in their system of thin lines of skirmishers followed at a great distance by large reserves out of all proportion to the skirmishers. As regards their "defense," their weakness seems to lie in the fact that they are disinclined to convert the "defensive" into a vigorous "offensive."

Although similar in many points, the French system is undoubtedly superior to the Russian, the former making every adequate provision both for the attack and defense.

On the other hand, there are several disadvantages to be urged as regards the French system, such as the evident failure to rely upon inde-

pendent thought and action on the part of commanders both high and low.

The Germans have a great pull in respect of their regulations, in that although they were not issued for 17 years after the last war, they have been adopted and carried out in the field, to the letter.

Implicit reliance is placed in the intelligence and common sense of all commanders, and in the capabilities of the men even when without commanders.

When such a spirit is evolved of its own accord, it needs no official cognizance or encouragement.

Military Notes.

AUTOMATIC BREECH MECHANISM FOR QUICK FIRING GUNS.

MONSIEUR G. CANET, whose name is so closely associated with the development of gun manufacture in France, has recently introduced a new form of breech mechanism, especially adapted for quick firing guns, and which possesses so many novel details that a description of its arrangement will be read with interest. Before referring to the latest pattern on this system which M. Canet has produced, says the London *Engineering*, to which we are indebted for the cuts and copy, we may say a few words about a comparatively recent patent that contains the first ideas on which the new method of breech-loading is founded. The views, Figs. 1 and 4, are taken from a patent dated May, 1894, and the leading idea described in the specification is as follows: A spherical breech block is employed, which has an aperture extending through it in such a direction that by turning the block on an axis transverse to the bore, it will open or close the breech, and which block is so constructed that a cartridge inserted through the aperture into the gun can be forced home by the surface of the block in turning the same to close the breech. On referring to the engravings, Figs. 1 to 4, it will be seen that the block, B, is contained in a seating, formed partly in the gun, and partly in the ring, D, which is screwed to the rear of the gun. In this position the block has an angular displacement of about 90 degrees, the movement being limited by the stop, E. The block is actuated by a horizontal shaft, H, and a handle, H1, at the side of the gun; the motions of this handle in one direction or the other serve to open and to close the breech respectively. The cartridge is introduced through the opening in the block, which, when in the loading position, is axial with the bore of the gun, and the act of inserting the cartridge sets the extractor mechanism in position.

From this early form the latest type illustrated by Figs. 5 to 7 has been evolved. The breech mechanism consists chiefly of a block formed, as regards the front portion, by a spherical surface, on the sides by two planes, and at the rear by a concave semi-cylindrical surface. The plane faces are grooved with a series of concentric threads that may have either a triangular or a square section. In the breech of the gnn a corresponding seating is cut parallel to the axis of the bore, to receive the block and its two lateral faces; it has, therefore, a series of concentric grooves similar to the threads on the block. When the breech is closed the block fits exactly to seating in the gun, and offers ample resistance to the powder pressures. A bent lever is either bolted to or forged on the block. The longer arm of this lever is straight, and moves in a vertical plane on the right hand side of the

gun ; the short arm is of a semi-cylindrical shape, and moves to and fro in a recess formed in the rear face of the gun. The axis of the semi-cylinder passes through the centres of the two series of threads and concentric grooves ; it is, therefore, around this axis that the oscillating motion of the block, in opening and closing the breech, is produced. These two movements are limited, the first by a stop set in the upper part of the seating in

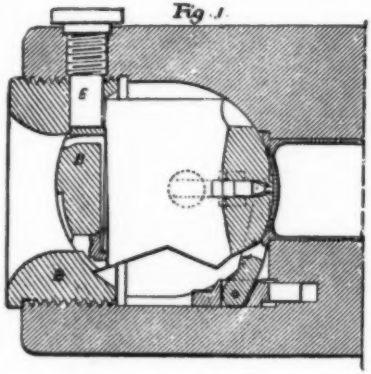


Fig. 1.

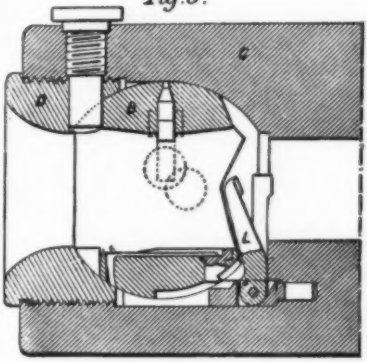


Fig. 3.

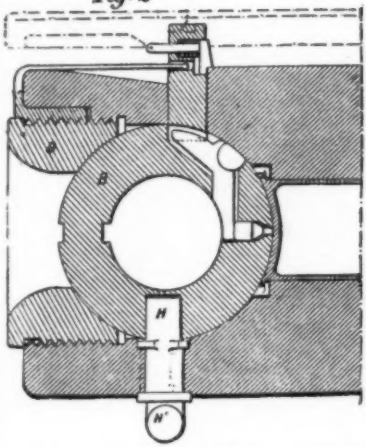


Fig. 2

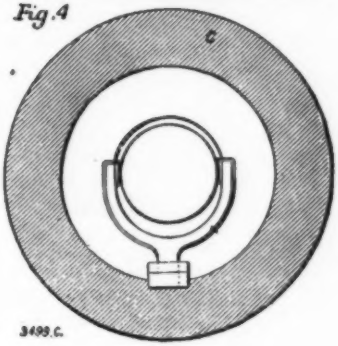


Fig. 4

the gun, and the latter by a special screw, the nut of which projects from the long arm of the lever. The length of this screw is greater than the depth of the nut, so that when screwed to the bottom of this latter it projects slightly beyond the inner face of the lever. The end of the screw that thus projects enters a circular groove cut on the right side of the gun. The length of this groove sets a limit on the range of travel of the lever, and at

the end it corresponds to the extreme open position of the breech. On the end of the longer arm of the lever slides a handle provided with a lateral tooth, which fits a corresponding recess cut in the side of the gun. Within the handle is a coiled spring which, when the breech is closed presses the tooth into the recess, and thus prevents the breech from moving until after the gun has been fired. The charge can be exploded either by percussion or by an electric fuse, or by both combined. In the first method, which is shown in the illustrations, a "repeating" device is used, that is to say, a device by which the same fuse can be acted on several times without chang-

FIG. 5.

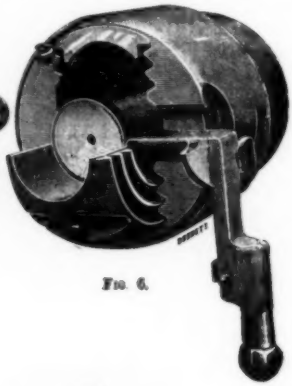


FIG. 6.

FIG. 7.

ing the position of the breech. It consists of a striker controlled by a V shaped spring and actuated by a detent with two branches, one of which carries a ring to which is attached the firing cord. These various parts, except one arm of the detent that is visible in the illustration, are mounted in a recess formed in the block. So long as the breech is not completely closed, the detent is fixed, and premature firing cannot take place. The cartridge cases are removed from the gun by means of a four armed extractor, which is placed in a recess in the gun. It is operated by the breech block itself, which bears against the two short arms of the extractor levers at the end of

the opening movement, and depresses them by its weight. To open the breech it is sufficient to press the handle on the lever and disengage the safety tooth already mentioned. The lever is then released, and as the centre of gravity of the block is located in front of its centre of oscillation, the breech opens automatically by reason of its weight alone. This movement is very rapid, because the block has only to make an angular movement of 90 degrees to open the bore of the gun completely. In this movement the rear semi-cylindrical portion takes a horizontal position, and at the end of the motion it forms an extension of the powder chamber and thus acts as a carrying table for the cartridges, which is a very considerable convenience when serving the gun rapidly. The arrangement is also convenient for the ejection of the cartridge cases.

To close the breech, a reverse motion is given to the lever, and as soon as it is thrown over the safety catch enters the recess and the breech is shut. The breech block and its accessories consist of five parts in all; these can be taken apart and reassembled by hand with great facility and with but little loss of time. The operation of dismounting is follows: The nut that works in the circular groove is run back, and the lever, thus set free, is turned through 180 degrees; the block is then entirely independent of the gun, and can be removed for cleaning or inspection, or to replace an extractor, or the firing mechanism. In its present form this very ingenious arrangement has been tested at the gun factory of the Forges et Chantiers company, at Havre, and has been found to give very satisfactory results. The advantages that are claimed for it, judging from the experiments made, are as follows: The mechanism is extremely simple and rapid in its operation, and is manœuvred by a single motion of the lever. The opening of the breech is entirely automatic. The mounting, dismounting, and examination are of a very simple character; there is absolute safety in working. There are no projecting parts in the way of the men serving the gun. All the parts of the breech are well protected by the gun itself, and there is nothing projecting at the time the gun is being loaded. The number of parts is smaller than in any other arrangement of breech closing mechanism, being reduced to four, when an electric fuse is employed, and to five in the case of percussive firing. The illustration shows the arrangement in full detail. We shall look forward with interest to the further experience that will be made with this highly ingenious device, and to the improvements it will yet doubtless receive at the hands of M. Canet.

TAPPING A TELEGRAPH LINE BY TELEPHONE.

Col. Bellon, of the French artillery, having observed that if a telephone is in sufficient proximity to, although not in actual contact with, a telegraph line, to be influenced by the current of the latter, certain sounds are produced in the telephone, whenever a message passes along the telegraph line. He has now succeeded by long continued experiments in drawing up a system showing the phonetic impression produced by each letter of the Morse alphabet, and thus enabling any one, with some practice, to read, by the sounds of the telephone, any message circulating in a neighboring line. It will readily be understood that this discovery may be of

great importance in war time, as in this way a telegraph line might be "tapped" without in any way interfering with the current circulating in it, and hence without the slightest indication to the stations connected by the line.—*Die Vedette.*

A METHOD OF WALKING.

It has always been the popular belief that there is but one way of walking—that which every one learns in childhood—but M. Marey, the famous French scientist-photographer, together with Drs. Comte and Regnault, have just made a report to the Academy of Sciences, of Paris, which seems to prove that the ordinary manner of walking and running is far from being the best and least fatiguing.

These savants explain minutely, by words and pictures, the difference between the right and wrong methods of locomotion, and tell how a man may quickly acquire the best method which will enable him to traverse long distances on foot without the least fatigue.

The idea originated in 1872, with a French army officer, Commandant de Raoul, but he was unable to get the war or navy department to recognize its utility. Now that it has been so clearly demonstrated by means of instantaneous photography, the French government may put it into use in the army.

Commandant de Raoul discovered this method of walking after many years of patient study and observation. He called it the "pas de flexion," or "flexion," or "bending step," to distinguish it from the "parade step" taught the soldiers. Its characteristics are that the body is inclined forward and the knees kept bent. The feet are raised only enough to avoid any unevenness in the surface of the ground, and the trained walker or runner glides along with the suppleness and agility of a cat. According to M. de Raoul, a pedestrian can cover five and a half miles in an hour's walking, or eight miles in the same time by running, with less fatigue than he could accomplish these distances in the ordinary way.

Though this method may be regarded as a new discovery, as it is quite unknown and unused among European nations as a distinct style of locomotion, yet among savage and half-civilized races it has been long in vogue. The Singalese and Japanese runners who cover sixty to seventy-five miles daily, month after month, the couriers and footmen of India, and some of the peasants of Asia, all swing their limbs in exactly the same way. In Belgium alone this method of walking has received the characteristic name of the "messenger's step," for it is like that of the rural postman. When a man is fatigued he drops into it unconsciously, calling into use, in fact, those muscles which he has been employing the least in the ordinary way of walking, and so letting rest those which have become fatigued. It is following out the same principle that the tired couriers of the Orient walk backwards in order to rest themselves without losing time on their way. The use of scientific photography has confirmed all these facts and has at last brought out the difference between the two methods very clearly. The human eye is not sufficiently quick to note each separate movement that a man makes in walking. The images strike the retina in such rapid succession that the mind is powerless to distinguish between them. But

by means of chronophotography M. Marey has been able to do this and to show clearly on the photographic plate, by means of pictures, scarcely one-fiftieth of a second apart, every minute motion and pose that a man makes or assumes in walking or running.

The experiments were undertaken by direction of the municipal government of the city of Paris, and were conducted in this wise. At a certain point in a carefully measured course a dial was placed, whose needle, moved by clockwork, made one complete circuit in the space of one second. The moment the man "en experience" came beside the dial, he entered the field swept by the camera. The movement of the step he made in passing the dial was therefore recorded in all its movements, the dial meanwhile noting in fractions of a second the exact time of the taking off of each of these instantaneous photographs, the aggegate time consumed in making the single step being from one-fourth to one-third of a second.

In the ordinary way of walking the body rises and falls successively. This, M. Marey states, is one of the principal directions in which force is wasted and lost. In one of the series of experiments a shining bit of metal was attached to the head of the subject in order to calculate exactly how much the body rose and fell with each step, and it was shown by the resulting series of pictures that range in ordinary walking was nearly two inches, while with the "flexion step" it was less than one. The difference seems of slight moment, but it has been computed that in running a mile in the usual way, a man loses enough force through these oscillations to enable him to climb vertically 250 feet. This loss by the new method is greatly reduced, the waste being only sufficient for an ascent of about 100 feet.

The reason for this is that by the new method the feet are only raised enough from the ground to clear any unevenness in its surface, and when the foot touches the ground, therefore, it does so more gently and gives the body less of a jar than in the ordinary way. The limb from the toes to the hip is bent—the foot at the ankle, the leg at the knee, and the thigh stands out at a sharper angle from the axis of the hip, which is the reason for the unusual suppleness of those who move after this fashion. As in jumping, it is best that the body strike the ground with the legs bent so as to lessen the shock, so it is that their being bent and flexible in walking causes the body to come down gently with each step.

Summarized in brief and simple fashion, the points of difference between the two methods of walking are these: In the ordinary way we hold our body upright and rigid and the legs stiff. We lift our feet higher in the air than is necessary and bring them down harder. The Raoul method teaches that the body from the hips upward shall be inclined forward somewhat, so that the centre of gravity shall be continually on the point of being lost, and the only way to keep from falling is to keep in motion. Now, as the centre of gravity keeps moving continually forward, it drags the weight of the body after it. In order to keep pace with this movement with the least effort the feet should be lifted and slid along just above the surface of the ground and just high enough to escape any irregularities in the path, and should touch the ground glancingly rather than coming down flat.

Certain simple rules have to be observed in learning or teaching people

how to walk in this way. The runner, for instance, begins by making very short, quick steps, 160 to the minute. The length of the step is gradually lengthened until—if he is even only an average man—he will find himself able, almost at the start, to do his first mile in eight minutes, his second in seven, the third in six and the sixth in about fifteen seconds less. These records have recently been made over and over again in France. When a man is well trained he can cover his third mile in five and a half minutes, or loaded down with the regulation arms and baggage he can accomplish easily eight miles an hour.

It is said that in this way a man's endurance depends entirely on the strength of his legs, for his legs give out first. Ordinarily one's "wind" is exhausted in running long before the muscles in the limbs have lost their springiness, but with the new method the reverse is true.

It is recommended that the runner hold his head up and take long, slow, deep breaths, and that when he reaches the end of his journey he gradually slacken his pace until he comes to a halt.

The question naturally arises why our present defective method of getting over the ground should have supplanted this much easier one that was universal, it is supposed, with primitive mankind. The answer is, that the use of various kinds of conveyances, from horses and wagons up to railway trains, has caused it to be unnecessary for people to travel far or fast afoot, and that thus their methods of walking have gradually changed. Among mountaineers, for instance, where horses and wagons are, and always have been, impossible, this same primitive method of locomotion is still a characteristic.

As may be supposed, the French scientists of the city of Paris are not engaging in these costly researches simply to pass away the time. Like almost everything else in France, the vast standing army occupies always the first place in the thoughts of the government. Now it is often the case that the soldiers of one army may be able to march further and more hours than those of another, and in this way many battles have been gained. It naturally follows that if this Raoul method of walking is adopted in the French army, as it undoubtedly will be, the old parade step will soon be a thing of the past, and the soldiers will go loping speedily over the ground, covering three miles or more to their untrained enemy's two, and be fresh and breathing easily when the time comes for close fighting.

Another point of view is the hygienic one. Walking is said by every physician to be of great benefit, and among the best of all forms of physical exercise. If the pedestrian follows this new method he can cover miles without fatigue or loss of breath. French physicians have already begun to take the matter up, and many people are acquiring proficiency with great rapidity in this new way of walking, which is the old.

THE OCCUPATION OF EGYPT.

It was doubted whether even British energy could build up a native Egyptian army. The officers, it was said, might make good regiments of the blacks who passed their lives in fighting, but you cannot carve upon rotten wood, and the fellaheen, born in the mud of a tropical delta and enslaved for ages, had lost, if they ever possessed, the Arab courage, and

could no more be drilled into fighting men than Bengalees or the Indians of Peru. Egyptian troops would be perfect regiments for parade, being the most obedient and orderly of mankind, but would be useless in the field.

Those who held this opinion were able to justify it, for they could quote the astounding cowardice of Gen. Hicks's army, in which whole regiments, moved, we fancy, as much by superstition as by fear, threw down their arms, fell on their faces before the dervishes, and begged as fellow-Mussulmans for their lives. The British officers, however, worked on; they gained hope from the behavior of their men in some petty skirmishes, and at last their young chief, Gen. Kitchener, trusted the fellaheen frankly in the field at Firkeh.

The Egyptians, who had been well fed, well treated, and thoroughly disciplined, responded to the call. They not only did not fly, but they charged as well as the Soudanese, "who are born fighters," and the last doubt as to their efficiency in actual hand-to-hand fighting disappeared. Good treatment and steady discipline had in the course of years restored their confidence in themselves and in their officers, and they showed themselves the equals of men who for generations have despised them as "tame Arabs."

That is a triumph for British organization, with its persistence, its lenity, and its almost automatic justice, and it is a triumph, too, for British honesty of purpose. It is not our interest to make good soldiers of the fellaheen, for the instant conclusion of the Continent will be that if the Egyptians can defend themselves the main argument for the British occupation of Egypt disappears.

It was not our business, however, to consider that danger, but to show thât even in the creation of a native army British administration was, as a Governor General of Java once described it, "the most vivifying despotism the world has ever seen," and that the work, which has taken fourteen years, was carried on patiently and steadily until the very nature of the conscripts seemed changed, and Arabs of the Delta charged victoriously upon the most renowned fighters among the Arabs of the Desert. The born children of Misr, where for 2000 years no man has been free, disciplined and led by British officers, scattered the descendants of the Shepherd Kings in a charge.

That, and not the victory itself, is the thing for Englishmen to be proud of, for no one who reads of it, not the most satirical stroller of the Parisian boulevards, can afterward say, at least if he knows anything of history, that the British occupation has debased the Egyptians.—*The London Spectator.*

FEW CHANGES OF PRINCIPLE SINCE MEN BEGAN TO FIGHT.

It is a common error that military tactics are quite different from what they were in ancient times. A brief glance at history will, however, show that the principles upon which troops are trained and fight have not been changed, but merely modified and developed to suit improved arms. A study of military subjects at the present time cannot but prove interesting to all citizens, and, as a distinguished military writer remarks, a perfect

knowledge of the principles of the art of war and of their correct application in theory may easily be acquired by any person of average intellect, although, of course, their correct application in practice belongs to a great commander alone.

The Greek phalanx, rendered steady and firm by discipline, overcame the undisciplined Persian warriors, and was in turn beaten by the Roman legion, rendered more mobile than the phalanx by constant training. After the Carthaginian wars, the Romans, learning by experience, formed strong reserves of horse and foot, which were brought into action at the decisive moment of the battle. Another point to be noted in connection with the legion is that it owed much of its success to the employment of a greater number of missile weapons than its opponents, and thus early we have the lesson taught of the necessity of obtaining what tacticians call "fire superiority."

The victories of the English army in the days of the Plantagenets were also gained by similar tactics, for they consisted in discharging large flights of arrows upon the enemy as he advanced to the attack, and then, when he was thrown into confusion by their fire, assuming the offensive and charging down upon his flank with large bodies of horsemen, which were always posted on the wings ready for that purpose.

After the introduction of firearms the first general to benefit largely by the change was Gustavus Adolphus. The success of this great commander was due to his clear perception of the fact that mobility must depend on discipline, and the great advances his troops made in development of fire. It was also to the understanding of these points by Frederick the Great, and the energetic manner in which he used his knowledge in the training of his forces that Prussia owed the rapid transformation of her army into the most formidable force in Europe.

Frederick's tactics, which were the basis of what are termed "linear tactics," consisted in forming his troops into two lines (the cavalry being on the wings, the infantry in the centre, and the artillery, usually in heavy batteries, on the front), and, when once the troops were engaged, in rapid firing and repeated bayonet charges. There were no skirmishers, for the line once formed was launched at the enemy and sought to overpower him as rapidly as possible.

The skirmishing tactics of Napoleon's army have been extolled for a whole century, and have been made the basis of regulations innumerable; yet it was through force of circumstances rather than from choice that these tactics were pursued. The French army at the close of the last century, composed of the levies of the Revolution, was not capable of fighting in line, and as there was no time to train it to the state of perfection required by that system, it was found that the best way for it to fight was in clumps, the braver spirits being pushed forward in extended order. With the unlimited numbers of men at the command of Napoleon, this method proved successful against the peace-trained armies of the Continent, but it broke down before the well-trained line of England.

During the present century great advances have been made in the improvement of firearms. The rifle took the place of the smooth-bore, the

breech-loader was substituted for the muzzle-loader, and now the magazine rifle has been universally adopted by civilized powers. Side by side with the improvements made in firearms, artillery has advanced step by step until by its mobility, rapidity of fire, and the deadly effect of its shrapnel shell, field artillery has become one of the most potent and terrible factors of the modern army.

What the battle of the future will be, when highly-trained and numerous army corps pour the concentrated fire of shrapnel and musketry, propelled by smokeless powder, upon one another, cannot even be imagined, much less described. Of this, however, we may be assured, that that army which makes "discipline" the basis of its organization and tactics will prevail in the future as in the past.—*The Pall Mall Gazette.*

CYCLIST CORPS IN WAR.

The last number of the *Spectateur Militaire* deals with the employment of cyclist corps in war, and especially with the advantages to be derived from the use of the folding cycle, to which reference was made in a recent number of this paper. The author of the article says that cyclists are neither cavalry nor infantry, but they do what cannot be done by either, and there ought to be provided for them special tactical rules suited to their case. The writer proceeds to say that the uppermost thoughts in the mind of a commander are expressed by the questions: Where is the enemy? What is he doing? What is his strength? What are his intentions? These questions cannot be answered so well by any branch as by cyclists. They can travel by carriage or by boat, and when on their own wheels on the road nothing can overtake them. Their moral effect is enormous, because they appear and disappear suddenly, and can undertake daring enterprises with impunity. It is mentioned in the *Spectateur* that during the last grand manœuvres in France the cyclist corps showed what could be done by intelligent and resolute cyclists. A detachment of dragoons from one side had reconnoitred well on towards the position of the other and was leisurely retiring. This was observed by a cyclist corps, which by rapidly moving forward on another road occupied a wood past which the dragoons had to move. The latter, having met no obstruction on their outward march, adopted no precautions on their return, and were surprised by a heavy fire at a short range from the cyclists none of whom could be seen. Their position in the wood was all but inaccessible to the dragoons, and when it was gained a detachment of cyclists could be seen in the distance returning at full speed to the place whence they had come. The French are not alone in their appreciation of the advantages to be derived from the intelligent use of this machine, but they seem to think that since Captain Gerard's invention has proved so useful, they are in the van of progress. The article concludes with a quotation from Colonel Langlois to the following effect: "Unfortunate is the nation which dares not do anything but imitate her neighbor; she will always be dangerously behindhand." Let us take that lesson to our heart; let us observe our neighbors, but mature our warlike methods in accordance with our own national characteristics and the records of our past achievements.

THE BATTLE OF FERKET (SOUDAN) AND ITS LESSONS.

For the last twenty years and a little over there have been two leading schools of thought in tactical matters, and between the two the fighting men of the army have narrowly escaped the proverbial fall to the ground. There was the old barrack-square school, in the main the direct heirs of our Peninsular and Waterloo traditions, who swore by the principle of mechanical obedience, and considered that "any innovation was to be deprecated" in view of the splendid services our war-seasoned soldiers then rendered to us. The convictions of the younger members of this school were considerably shaken by their personal experience with our long-service peace-trained men, in the Crimea and the Mutiny, and a vast number of the junior regimental officers who had actually led their men in both campaigns were already predisposed to apostasy when an overwhelming impulse in that direction was imparted to them by the introduction of the breech-loader and its triumphs on the field of Sadowa—triumphs confirmed within four years' time by almost unprecedented results obtained against the Imperial French army on the battle-fields. Even at the risk of unduly lengthening this article it is imperative to amplify this point, for the closeness of the connection between the two services, British and French, was far greater than is usually imagined. Amongst the men in the home army who then held high appointments, or who were rapidly coming to the front, a startling proportion had fought shoulder to shoulder with the French, and had been eye-witnesses of the desperate gallantry with which Pelissier's men fought at both assaults of the Malakoff, leaving on both occasions a greater percentage of men in the storming divisions disabled on the ground that any European troops since Waterloo. That such troops should have been beaten by an army of men, of which as a body English soldiers had heard but little, naturally predisposed those who knew the quality of the vanquished, to expect wonders from the conquerors, and public opinion in the army, never having been trained to habits of exact thought, jumped eagerly at the published accounts of the victors for the necessary information. It happened that the bulk of the victorious army was in itself no better trained to appreciate the consequences of its own action than the spectators, because for every hour's fighting the majority of them had witnessed ours had seen months and even years of almost constant struggle. Hence they were carried away by the vividness of their first impressions, and our more seasoned men, in presence of the new factor, the breech-loader, felt compelled to accept their conclusions because they had no personal experience by which to appreciate them. These conclusions may be summed up in one sentence. The Germans had fought in extended order and had been victorious; therefore everybody else must fight in the same order, if they would avoid defeat, and forthwith it was demanded by our forward party that the whole spirit of the British soldier's training should undergo profound modification to adapt it to the new order of circumstances. It was in vain the old school objected; it was suggested to them with considerable freedom that they had no personal experience, and were therefore incompetent to express an opinion; and when, in spite of this rebuke, they endeavored to point out that the effect of a bullet on the human frame was

very much the same at whichever end of the barrel it happened to be inserted, they were called bow-and-arrow generals and the like. Their recognized leader, indeed, went so far as to assert that under modern conditions "drill was about as useful to the soldier as a knowledge of the hornpipe," an assertion greedily seized on by all either too lazy to master their drill or deficient in those peculiar attributes of leadership that enable a real drill-master to control the individual wills of thousands. How far along this downward path we had progressed was sufficiently demonstrated by the conduct of our infantry in our numerous little wars, which it is well known has not been of a nature, except in perhaps two instances, to have earned the unqualified approval of the Iron Duke or any of his chief lieutenants. The officers on the spot themselves were anything but edified by their experiences. Examinations in tactical works "made in Germany" had already rendered them somewhat indisposed to the new order of things, and, when in face of the enemy they rediscovered that true discipline was after all the key of the whole situation, they revolted almost all along the line, and, recognizing that drill was after all the only safe road to steady discipline, they have gone far to undo the miserable consequences in which the "go-as-you-please" or "Ballyhooly" school had involved us.

Still the issue remained far from clear. Individual battalions, the conditions of the service in which they have been engaged, all vary so widely, that reasoning on the available evidence only, and without reference to the supreme condition which rules the whole matter, viz., the immutable principles of human nature, it remains difficult for one side or the other to prove its case satisfactorily. And so it must have remained had not the brilliant little action at Ferket afforded a startling illustration of the truth for which the new school is contending. Some twelve years ago the Egyptian army fell into the hands of a body of officers who one and all had acquired their knowledge in face of the enemy, and who realized the fundamental truth that steadiness, which can only be acquired by drill, was the sole guarantee for successful fighting. Month after month they labored at their work till eye-witnesses all combined to assert that their men were as steady on parade as our picked battalions; and the result has fully justified their labor. Against the same enemy which has so often driven our own men into square, and over and over again made good their charge to our very muzzles, the despised fellaheen have advanced in line, and by their steadily-controlled fire have broken every rush before it could attain them. We make all due allowance for the different nature of the ground, even for the somewhat deteriorated fighting quality of the enemy, who never seem to have been quite the same old "Fuzzies" since they secured a fairly adequate supply of breech-loading rifles. But when all is said in depreciation of their recent achievements, we submit that the steady close-order drill school, to which the Duke of Cambridge was such a devoted adherent, has scored a notable triumph which it will take all the ability of the Ballyhooly tacticians to explain away or modify.—*Army and Navy Gazette.*

SEPARATION OF THE ROYAL ARTILLERY.

To the editor of the Army and Navy Gazette: Sir—In your article of

May 2 last on "Artillery Organization" you state that "the Royal Regiment of Artillery is ripe for separation," and you accept this fact as a sufficient reason for separating the mounted and dismounted branches one from the other. May I, with due deference, submit that the question is not whether the Royal Artillery is or is not "ripe" for the change which you advocate, but whether, having regard to the existing conditions of Imperial defense, such a change is desirable in the interests of the public service? Hitherto artillery officers have been trained for all-round work at home and abroad, in garrison and in the field. This system was found to work well during the Peninsular War, and has been maintained with advantage ever since. In the Crimea officers who fought with their batteries at the Alma subsequently took their turn in the trenches before Sebastopol, and it will be within your recollection that the siege could not have been continued had not this reserve of artillery officers been available to reinforce the siege train. During the Indian Mutiny several horse artillery batteries were temporarily employed as siege batteries at Delhi with perfectly satisfactory results. In Egypt during 1884 86 batteries of garrison artillery were repeatedly sent to Suakin and up the Nile with field equipment which was withdrawn when the service for which they were detailed was finished. If your proposal be adopted this interchangeability of duties will no longer be possible. Garrison artillery officers exclusively trained in cells and casemates on the coast will be useless for work in the field. The field artillery would have to be increased at great expense, for which there is no sufficient justification. In your article you point out how remote the chances of war service are for garrison artillery officers. Undoubtedly this is so, and as year by year the navy grows stronger these chances will become correspondingly more and more remote. To counterbalance this disadvantage your proposal is to give officers of the garrison artillery other inducements such as extra pay and "a smart gala uniform." Is it likely that these artificial methods will impart life and spirit into a corps which if given a separate organization will be permanently cut of from what a soldier values most, the hope of active service? And will the country consent to maintain a huge sedentary corps of 800 officers and 15,000 men whose training during peace, however scientific, unfits them during war for employment as a fighting force in the field. The present system by which artillery officers, like their brethren in the navy and Royal Engineers, are trained for all-round work seems most adapted for the purposes of imperial defense. No supposed gain in technical efficiency will make up for loss of elasticity of organization which has been so helpful in the past and will be more than ever necessary in future wars. What seems to be wanted is to improve rather than uproot the present organization so as to insure all artillery officers being thoroughly trained in both branches before promotion to field rank. Hitherto this has been left to chance and individual personal interest. It would be quite feasible by strict administration to arrange for all lieutenants and captains to pass half their service in each branch, and thus insure their ability to take their place in field or garrison according to the necessities of the hour. I have ventured to make these observations from an outside point of view as I feel sure that the proposed change, how-

ever agreeable to the personal wishes of Royal Artillery officers, would seriously embarrass the authorities who would be charged with providing for artillery requirements in time of war. STAFF OFFICER.—*Army and Navy Gazette.*

MAXIMUM WEIGHT FOR SOLDIERS TO CARRY.

Sixty pounds is about the maximum weight that a soldier can carry a long distance without any injurious effects. The German military authorities have been experimenting in this direction, and they have come to the conclusion that an ordinary man cannot conveniently carry a greater weight than this at the rate of twenty-five miles per diem when the march is continued for a number of days. A load of 68 lbs., it was discovered, could not be carried twenty-five miles without danger of serious injury. It was also found out that a load which could be carried for twenty-five miles in a temperature not exceeding sixty degrees without any injurious effects, even when continued for several days would, if carried when the temperature was ten degrees higher, have a temporary bad effect.

MOLTKE'S MILITARY CORRESPONDENCE.

A work has appeared in Berlin entitled "Moltke's Military Correspondence," which contains matter of much interest in connection with the Austro-Prussian War. It is compiled from the official documents of the war of 1866, and is edited by the Historical Department of the German General Staff. The book comprises 304 documents, chiefly essays and letters written by Field-Marshal Moltke in the period from 1860 to 1866. The gem of the collection is a letter addressed to Prince Bismarck, dated Berlin, August 8, 1866. It runs as follows:—

"I take the liberty most respectfully to communicate to your Excellency a short *exposé* of our present military position as regards France, and I may first remark that, according to our calculations, France cannot collect an army of 250,000 men ready for war between Metz and Strasburg in less than twenty-six days. It is manifestly of the utmost importance to come to a final settlement with Austria as soon as possible, in order to have our hands free in the east and the west, if our neighbors should attempt to rob us of part of the fruits of a victorious campaign. The main thing, therefore, is not to insist on conditions of subordinate importance in the Prague negotiations, but to get the troops at present in Bohemia and Moravia at our disposal as soon as possible. The most probable possibility is that France may demand cessions of territory incompatible with Prussia's historical task of uniting and protecting all Germany, a task towards the accomplishment of which the most important step has just been taken. In view of such presumption on France's part, war would be popular all over non-Austrian Germany. It can hardly be doubted that an alliance can be concluded with the South German States against France by giving up the greater part, or even the whole of the territory occupied by us south of the Main. In this case the new alliance would embrace not only North Germany but all Germany. The South German contingents could be assembled at Mannheim, in their present state of readiness for war and in their present arrangement, in eight to ten days about 80,000 strong. In the same

time our army on the Main and the Reserve Corps would concentrate round Mayence 90,000 strong, the former by marching, the latter by rail or by marching, according to circumstances. It remains for the present at Nuremberg, or is now ordered to march at once to Würzburg. France cannot possibly, in an equally short time, assemble an offensive army strong enough to cross the Rhine at any point in the teeth of these first accumulations of troops, and when peace is concluded with Austria it is merely a question of time how quickly an army fully a match for that of the French can be concentrated in the west. The chances of the French Empire in a war against victorious Prussia and the whole German nation seem so unfavorable just at present that it will not be ventured upon without an understanding with Austria as to the continuation of the conflict, which, indeed, would prevent the conclusion of peace. It is therefore necessary to take such a contingency into account from the military point of view."

Count Moltke then gives a minute description of the military measures necessary in that case, and concludes as follows :—

"On the whole, it is, therefore, evident that a simultaneous war against Austria in her present weakness, and France, must be waged more on the defensive principle, but it is not to be shrunk from in view of the great ends to be gained. Even an issue not successful at all points would rally all Germany round Prussia for all time, whereas the voluntary cession, even of the smallest piece of German territory, would render Prussia's future leadership impossible. If it prove practicable to conclude peace with Austria in the next few days, France will certainly abstain from making any claims in the immediate future, for she could not choose a more unfavorable moment for war than the present. Afterwards the main thing would be to consolidate North Germany quickly, in order to meet future dangers from the west and the east with adequate force."

This letter of Count Moltke's is certainly one of the most important historical documents that has recently seen the light.—*Army and Navy Gazette.*

MR. JAMES A. LONGRIDGE.

We have before us what is, we believe, the last work from the pen of the late Mr. James Atkinson Longridge, who died the other day in Jersey. When the history of modern guns comes to be written, Mr. Longridge's name will occupy a prominent place. For a long series of years he urged his views upon gun construction upon the authorities without success, but at length objections were overcome, and in the little work, "The Progress of Artillery : Naval Guns," just published, he was able to write that at the present time all guns above 3-in. calibre for the British service are made on his system. The arguments in favor of comparatively short guns with high pressure, and the method of wire-winding, have been so often discussed that we shall not enter into them here. Mr. Longridge's latest work states his views anew, and answers many objections that have been put forward. Mr. Longridge did not propose to replace all our guns at once. "Many of them," he wrote, "are excellent guns, and the wire guns might at any rate be used with a considerable increase of pressure provided the difficulty about the firing apparatus be overcome." But he was convinced that all

new guns should be made for a working pressure of about 30 lbs. per inch. He would have been content at present to change the six 110-ton guns afloat for a new type of 60-ton guns, 14-in. calibre, 30-ft. long, and the sixty 67-ton guns for a new 12-in. of forty tons, 25-ft. long. He gave the aggregate energy of the sixty-six old guns as 2,440,140-ft.-tons, and calculated the energy of the guns he would substitute at 3,008,420 ft.-tons, making an increase of 24 per cent. of energy with a decrease in weight of 47½ per cent. It was not his purpose to arm new ships in this way, but with a new high-pressure 10-in. gun, equal in power to the 12-in. Woolwich Longridge gun. The proposed gun would be 24-ft. long, weigh twenty-four tons, and throw a 500-lb. projectile (with a charge of 134-lbs.), penetrating 25.49-in. of wrought iron. We commend Mr. Longridge's pamphlet to all students of gunnery. There is a melancholy note at the end of it: "It took me about thirty seven years to overcome the inertia of opinion against wire guns; how long will it take to overcome that against high pressure?"—*Army and Navy Gazette.*

DOGS IN WAR.

Herr Karl von Donat must feel gratified to observe that the idea originated by him of using dogs in war has been successfully followed out. It is stated in the *Avenir Militaire* that there are great numbers of dogs under training for employment in the German autumn manœuvres at a place near Cologne. These dogs are fitted with saddles, in which are carried *eau de vie* and the first necessaries for the wounded. They are taught to lower themselves beside men lying on the ground, so as to allow the contents of their saddles to be reached, and as they are trained to look for and find wounded men they will be messengers of mercy on the field of battle pending the arrival of medical aid. Scotch collies are said to be the best dogs for the purpose; and so they may well be except for their uncontrollable propensity to give tongue. This has, according to reports, been overcome, and if so there will be a large and very useful field for the employment of dogs on outpost duty and in many other circumstances.

Some years ago Lieutenant Jupin urged the use of war dogs on the attention of the French military authorities, but with very small success. This is deplored by the writer in the *Avenir Militaire*, who can see that every means should be resorted to with the view of keeping pace with the enterprising but careful military power across the Rhine. That power experimented with war dogs in the autumn manœuvres of 1895, and was sufficiently satisfied with the results obtained to continue and extend them in 1896. The consequence is that Germany will be the first in the field in respect to the knowledge and practice of this adjunct of warfare, and if any advantage is to be got out of it the plodding pains of Germany will get it. Where do we stand in this matter—we who have the best dogs, the greatest number of dog shows and dog enthusiasts, and who can train dogs to do anything and everything? Why, we stand nowhere. Our imitation of the German army is confined to matters which do not suit our national tastes, but when it comes to a branch of field service in which we are naturally fitted to be *facile princeps* we do not get a chance to try.—*Army and Navy Gazette.*

LYDDITE.

The decision of the Admiralty to supply the ships of the Channel Squadron with "lyddite" shells should give us the lead of all nations in the matter of high explosives. We have known for some seven or eight years that it was possible to fire these projectiles from guns with cordite or with gunpowder, but the risk of premature explosion from chemical changes in the bursting charge has always, we have understood, been the reason why such shells have not before been supplied to ships. Apparently the authorities have satisfied themselves that there is no such danger, and although no doubt there will be those to raise an objection as in the case of the water-tube boilers, we believe the Admiralty will in this matter as in that, have public support. The explosion on board the *Amiral Duperré* will very likely be cited as a cause for alarm, but in regard to this affair it is to be noticed that we have not yet had a satisfactory statement of the facts. The story that the powder charges and the filled mélinite shell were in the same magazine is quite incredible. Moreover, it is at least uncertain whether any mélinite shell have yet been supplied to French ships, There was no truth in the report that the French ships used high explosives in forcing their way up to Bangkok, and the Japanese equally deny that they employed them at the Yalu. It is most probable, therefore, that by its present action the Admiralty have repeated the advance made when 4.7-in. and 6-in. quick-firers were supplied to our ships, and again with the provision of torpedo-boat destroyers. This will certainly be the case if it be true that a means has been found for insuring penetration for these shells of four inches of armor.—*Army and Navy Gazette.*

PEGAMOID.

The word "Pegamoid" has of late become familiar to the eye, but it is not every one who knows what it is. The registered trade-mark "Pegamoid" has been given to certain patented processes which have the effect of water-proofing and generally protecting any material—such, for example, as paper, leather, cotton, linen, woollen, and other cloths—to which they have been appled. These processes have been subjected for several years—by experts in the various trades and manufactures affected—to the severest tests, and the inventions (which are the subject of English discovery and enterprise) are protected by ,patents. Articles which have been treated by the "Pegamoid" process are rendered more durable, more elegant in appearance, and more useful. They are damp proof and insect proof, soft and flexible, cheap, and unaffected by changes of temperature and climate. "Pegamoid" brand leather is expected to supersede the real morocco leather, for it is cheaper and looks equally as good, and it will not stain or rot. Printed papers so treated are washable; they keep their colors, and they will not spot or stain with rain or damp. Maps printed on this material serve their purpose far better than those printed on ordinary paper or cloth. For naval and military charts and for cyclists' touring maps it should replace the old style, as it is impervious to damp. In the course of exhaustive trials conducted in the early part of last year by the *Field*, cartridges made with these and ordinary gas-tight cases

of best quality were placed under water for two hours, when the ordinary cases refused to go into the gun at all, while the "Pegamoid" cases acted splendidly, and the mean velocity in 40 yards, as taken by chronograph, was only 10 feet per second less than it was when the cartridge cases were used in their normal condition. It would be practically impossible to enumerate all the purposes for which the waterproof cloths are supplied. They are applied to all kinds of blinds and to tents and awnings. Equally also is it used for the handsomest of dining-room tables and office desks; while even cretonnes so treated can be washed with a sponge and cleaned without being removed from the furniture which they decorate.—*United Service Gazette.*

USE OF THE TELEPHONE IN WAR.

An interesting experiment of installing a telephone by trotting cavalry was recently successfully undertaken by some Prussian Uhlans between Berlin and Potsdam. Two sets of officers proceeded from Berlin to Potsdam. Each set was equipped with a complete telephone apparatus, which, together with the requisite quantity of thin wire, was carried by one of the men in a leather case on his chest. The end of the wire was, by means of a fork fixed at the end of a lance, thrown over the tops of the trees along the road. As each kilometre of wire was thus suspended, a halt was made to ascertain whether there was connection with the station. A new kilometre of wire was then connected with the former, and the march resumed. The two sets met at Teltow, where the wires having been tested, were connected, and telephonic connection between Berlin and Potsdam was established. The distance is about twenty miles, and the whole task was completed in about four hours.—*Journal of the United Service Institution of India.*

FRENCH MUSKETRY REGULATIONS.

Captain H. H. Wigram, *p. s. c.*, Scots Guards, has prepared a *précis* of the French Musketry Regulations of 1895, which substitutes an entirely new system for that previously in use. The rifle is the Lebel, 1886. Its maximum range is 3500 yards; a bullet is liable to ricochet up to 2200 yards, and a ricochet from a point 1600 yards from the firing point is dangerous up to 2400 yards. The culminating points of the trajectory are: at 500 yards, 4 feet 6 inches; at 1000 yards, 32 feet; at 1500 yards, 103 feet; at 2000 yards, 247 feet. The trajectory up to 200 yards is practically flat, the culminating point being 4 inches.

In each battalion a captain, designated the musketry captain, assisted by a subaltern, superintends the musketry; and the two officers perform many of the duties discharged in the British service by the assistant adjutant. Each company has a musketry sergeant. The course of theoretical instruction closely resembles the British. Judging distance is taught to all ranks up to 600 yards, and to commissioned and non-commissioned officers up to 1200 yards, after having undergone a preliminary course of instruction. The Goulier, rather a complicated instrument, is superseding the Labbez telemeter previously in use in the French army. It consists of a double-reflecting prism and a series of lenses of curious construction. It

works with a normal base of 20 metres, and is used somewhat after the manner of the Weldon range-finder.

Before commencing target practice on the range, a practice similar to the Morris tube is carried out, with 150 rounds, in individual practice at stationary, moving, and vanishing targets, rapid firing, individual firing by word of command, and volley firing. The trained soldier is allowed 120 rounds per annum. Individual practice is carried out in drill order; other practices in drill order with the pack; practices at unknown distances in marching order. After the completion of the *tirs d'instruction*, which consists of forty-two rounds at distances between 100 and 400 yards in different positions and with different sized targets, the soldier enters upon a course of instruction intended to enable him to make intelligent use of his weapon in the field of battle. He is shown targets such as he may be expected to find in the field; he is taught to make intelligent use of cover, to estimate distance and adjust his sight; is put through volley firing and finally field firing.

The *tirs d'application* consists of forty-four rounds at dummies at various distances between 200 and 600 yards; but no man is allowed to take part in it until he has made at least twenty-five in the *tirs d'instruction*. All officers below the rank of captain fire with their companies, but with captains it is optional. The *tirs de combat individuels* are carried out against parties of men who are in advance or retreat, are taking cover behind trees or hedges, etc. The soldier is taught to avail himself of natural cover, and to utilize any support which he may find near him to steady his rifle or support his hand. The *feux collectifs* are executed similarly to the corresponding practices in the British service. They consist of section volleys at dummies at 800 and 1000 yards, fourteen rounds being expended, and twenty rounds at dummies between 200 and 900 yards, individual fire advancing, between 600 and 900 yards, rapid at 350 yards, and eight rounds in thirty seconds, magazine time, at 200 yards.—*Journal R. U. S. I.*

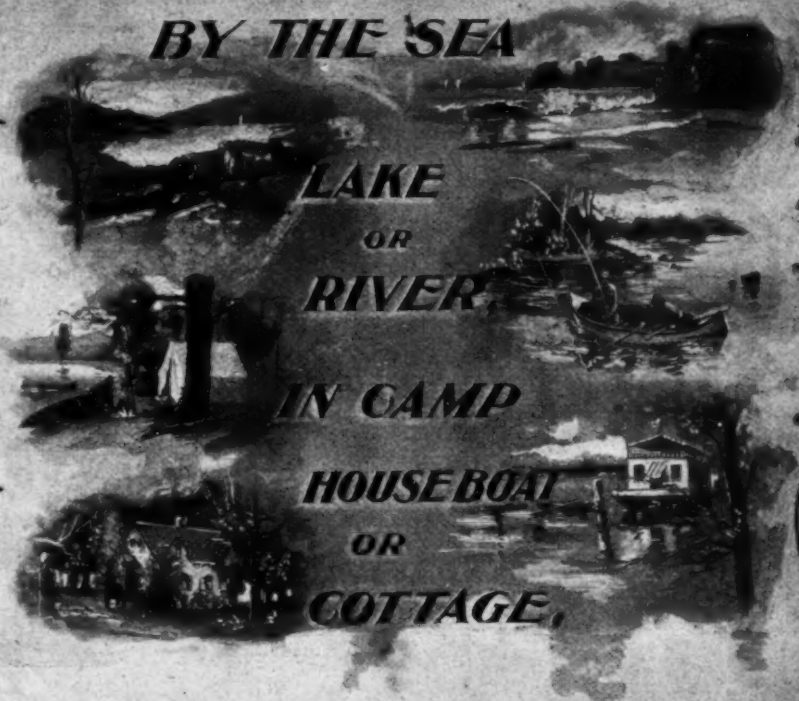
THE HORSELESS CARRIAGE RACE ON DECORATION DAY.

The General of the Army, the Chief of Engineers U. S. Army, Vice-Pres. Webb of the New York Central, and Mr. John Jacob Astor, composed the *Cosmopolitan Magazine's* Board of Judges to decide the merits of the horseless carriages which entered in the May trials, for which the *Cosmopolitan* offered $3000 in prizes. This committee is undoubtedly the most distinguished that has ever consented to act upon the occasion of the trial of a new and useful invention. The interest which these gentlemen have shown in accepting places upon the committee is indicative of the importance of the subject, and that the contest itself was watched with marked interest on both sides of the Atlantic.

Four of the six competing carriages belonged to the Duryea Motor Company of Springfield, Mass.; of the other two one was the Booth-Cranch carriage and the other the Roger vehicle, a French invention.

The prize was awarded to Mr. Charles E. Duryea of Springfield.

The trial proved beyond question that the American horseless carriage is a success and is well adapted for use in our cities, as it appears that it can be turned and stopped more easily than ordinary vehicles.



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Comment and Criticism.

"The Status of Medical Officers."*

Major H. S. Kilbourne Surgeon.

Ne quid nemis.

THE difficulties encountered by the artillery in solving the problem of the proper *status* of their associates of the medical department of the army, among many others, to the solution of which they have brought distinguished ability, would be lessened in some degree by a preliminary elimination of the personal equation. Their views have been more or less distorted by the atmosphere and apparatus of their specialty. And also limited, perhaps, by lack of contact with the objects of their criticism under different conditions of service from the prevalent ones, *i. e.*, in war. It does not follow, for example, that because there exists stagnation of promotion in the artillery, in time of peace, that the advancement of medical officers is too quick. Neither does it follow that because a relative disproportion of rank, promotion, or numbers, may be shown to exist in a staft corps, that such conditions are inequitable or unwarranted. They are reminded that an army is organized for war, and that an adjustment of its component parts on a basis of peace might and would fail to insure efficiency under the stress of war, wherein expansion of the militant body is sudden and unequal. Now such expansion has been foreseen, and to some extent provided for, in the organization of the medical department of the army. It has not, unfortunately, yet been provided for in all other departments and arms of the service. Whether such provision is the more necessary in the one case than in another, it might be invidious to inquire. But the fact remains that the contingency of war has been considered in this instance, in some directions. But not in regard to the present ratio of its enlisted strength to the total strength of the army, as has been stated.

The ratio of strength of the hospital corps to the total strength of the army is determined by local conditions. The distribution of the troops in small garrisons along an extended frontier and requiring at every station a *minimum* number of men for effective sanitary service, swells the total beyond what would be sufficient with greater concentration of forces. Comparisons of ratios of strength with foreign services are therefore misleading, where similar conditions do not exist. And this greater ratio, although in the direction of expansion for war, is incidental only to the distribution of troops in a peace establishment, under exceptional political, economic and social conditions, in the United States. Similar exigencies of service affect the number of officers needed. Nor is there better reason to believe that medical officers are more ambitious to go beyond their "proper sphere" than any others. Ambition may be imputed where only zeal exists.

As to the first question, the rate of promotion: It is indisputable that none but quali fied men are wanted in the medical staff, where there is no place for others, if competency

*See JOURNAL No. 80—March, 1896—p. 429.

In connection with the above comment we respectfully invite attention to the reprinted article by Brigade-Surgeon Lieut.-Col. Hill-Climo, page 347 of this number—ED.

and efficiency are to govern in the selection. The standard of qualifications has been periodically advanced until, at the present time, more than five years of preparation in a professional training are requisite for the personal equipment. Of this the Government has, until recently, provided nothing. But to others of the Staff and line it has given and still gives from four to seven years of training and maintenance during the period of pupilage. Equity demands for the medical officer a compensatory recognition of this lack of assistance in the preparation for its service. It has been freely accorded in the form of rank. And, more recently, eligibility to command has been conferred with the object of promoting efficiency. It does not appear that consequently these officers are the more ambitious to acquire command beyond the limits of their functions, or the necessary development of their corps. And here it is pertinent to inquire, if the medical staff be deprived of the privilege of command, how they shall otherwise acquire that experience in administration and initiative needful in war. Authority within the limit of functions must be granted to secure efficiency. And its denial has heretofore been the cause of conspicuous failure, in more services than one. It is needless to show that in a military body there can be no real authority without the attributes of rank and command. The aid required of a sanitary department, in a great war, under the new conditions of the development of the art, must have a corresponding development and extension. The destruction of battle grows more appalling with the adoption of new weapons and new methods of slaughter.

An army is more than ever before likely to be overweighted with the burden of its casualties. The promptness with which it is relieved of this disability and the skill with which it is disposed of and restored to its place, are elements of efficiency demanding an auxilliary service of a high order of excellence. It is clear that no casual and haphazard makeshift can here take the place of a competent organization and equipment. In this view the danger of preponderance appears, on the whole, less real than the danger of collapse. Consider the nature and scope of the services rendered: The medical officer stands at the doors of entrance and exit to and from the military service, through which all pass, where inefficiency would work deterioration from the beginning. He wards off pestilence, the destroyer of armies, more potent than an armed adversary. He prevents wasting disease, which disables and kills more than the sword. He binds up the wounds, and mitigates the terrors of war. He, in part, measures the rewards of valor and faithful service. And he, more than any other, is constantly present with the soldier and his immediate superior, in all situations and exigencies of service to perform these multiform duties. It is an easy task to show that the potential of modern armies depends more largely on capable sanitary service, in its wider applications, than upon any other single element in their composition. And further, that such service properly includes the supervision and direction of many details, when an army is brought into action. And here comes in sight the development of military sanitation from the germ of a mere personal service which was anciently the only function of the surgeon, into an art extended into all departments of corporate activity. That nation or people which fails to perceive the nature of this advance and adequately to provide for it, will come to count the cost of such failure. In the conditions of modern warfare the primitive distinctions between combatant and non-combatant have practically disappeared. The forces which coöperate on the field, to place the soldier on the line of battle, to keep him there and, when his work is done, to take him away, are all combatant. All are exposed to the fatigue and casualties of war. All may claim the reward of their skill and valor. The terms of the Geneva Convention in no way affect the *status* of medical officers. They were devised to secure protection and humane care of the disabled and helpless in war. That they may incidentally operate at times to protect those who aid them, is true. But the fire of a battery

does not slacken because there are wounded men in its front, nor is a gun with a range of five miles a reliable keeper of conventions. Bullets are born blind and an exploding shell is no respecter of persons.

The antique figure of the knight in mail, who alone sustained the shock of battle, and to whom all others were but servile auxiliaries, has been displaced in the march of progress, by the organized, living machines, which now form the body of war—the armies of enlightened nations. To displace one of its constituent parts, or to hinder its operations, is not the way to enhance its powers in action. The medical department of the army has been long in achieving its present *status*. But having acquired it it will not fail to maintain it, as long as its own interests are coördinate with what it believes to be the higher interests of the military service. It will not attempt to "dominate the army." It will do, as it ever has done, while advancing the standard of its own efficiency, join in the work of making that advance general, which it cannot concede, in its own case, has been too rapid, or subject to invidious comparison. If artillerymen will get away from the smoke of their guns long enough to obtain a clear view of their surroundings they may find the signs of activity and progress along other lines of projection than their own, which though less brilliant and impressive than the results of their own labors are, nevertheless, indispensable to success in war. And, what is of greater significance, they will see that as the destruction of war is widened and accelerated the conservative forces which operate to mitigate its terrors must keep equal pace, or in their failure, war becomes impossible among civilized peoples.

II.

"The Sioux Campaign of 1890-91: A Reply."

First-Lieut. W. P. Richardson, 8th Infantry.

LIEUTENANT HAWTHORNE has forced me to a reply on the subject of the Sioux Campaign of 1890-91 much against my wish. I will be as brief as possible, however, for his comments—JOURNAL for July—do not merit, either in tone or substance, an extended rejoinder.

My first impression on reading his criticism was that I had made a serious error in not consulting his "memory" in regard to this subject in the first instance; but closer examination revealed so many inconsistencies and such ignorance of well-known, published facts that I felt impelled to a partial restatement of the case.

Lieutenant Hawthorne seems to know that there was a fight with some Indians at Wounded Knee Creek on December 29th, 1890, and that he was present; but beyond these facts his statements are at variance with what is generally understood regarding this affair. He seems to scout the idea that the Indians have any side to be presented in the matter.

I pass by, except to mention it, his remark about what I "owe to the readers of the JOURNAL" and his other statement that the items he calls attention to are "quite incorrect and most of them wholly imaginative," and will examine as briefly as possible how well he has fulfilled his own obligations in these respects.

He first takes exception to my writing of Wounded Knee as an "unfortunate affair." This phraseology I confess I borrowed from the report of the Secretary of War, 1891, Vol. I, page 150, as follows: "The unfortunate affair at Wounded Knee Creek, December 29th, 1890, in which 30 officers and soldiers and 200 Indians (men, women and children) were killed or mortally wounded, prolonged the disturbance," etc. Note here the number of Indians mentioned. It strikes me as an apt term to apply to the miscarriage of a well-laid plan resulting in the death of gallant officers and men, to say nothing of the Indian killed.

Lieutenant Hawthorne is wide of the mark when he intimates that I have made a charge of savage cruelty against my fellow-soldiers; moreover, I don't think that the 7th Cavalry need his defense of them. I wrote that the destruction of Indian life "was carried to a most distressing length." That such was the case, and that it was distressing to a sad degree, I submit to the unprejudiced judgment of any fair-minded reader. I also stated that the Indians were shot down as they ran, and that firing continued after resistance had ceased. These are well-known facts, and I have them from reliable sources. I do not wish to go further into these particulars, their proper defense lies in the conditions surrounding the fight and not in an angry effort to dispute them. What else could be expected from troops acting under orders to destroy the Indians in case of resistance? with a fight thus precipitated upon them, and in presence of a number of dead and wounded comrades, killed by the sudden and unprovoked fire of these Indians.

Having mistakenly assumed as a basis for his argument that I had made this charge against the 7th Cavalry, Lieutenant Hawthorne is wholly illogical in his reasoning to show why such an accusation was unnecessary and groundless. Without going into detail, I will remark that my critic does not seem to apprehend the meaning of "esprit de corps," or else he fails to appreciate its influence upon a regiment having a record and tradition and with a quarter of a century of such service and hardship on the frontier as had fallen to the lot of the 7th Cavalry.

As to the position of the troops when the first shot was fired, I invite the attention of all interested to the official map of the dispositions, found on pages 154-55, Report of the Secretary of War, above referred to.

In respect to the time when the fight began, I wrote:—"A search was ordered. The instant this began the Indians whipped out guns," etc. The search spoken of here was intended to mean search of the Indians' persons, which could be the only conclusive one under the circumstances. It appears, however, from an extract from General Forsyth's report, kindly furnished me by Captain Huggins, 2d Cavalry, that a considerable number of Indians had been searched, and 48 guns secured, before the fight was precipitated. I had been corrected upon this point before the appearance of Lieutenant Hawthorne's comments, and while I cannot view it as one of great importance, except as indicating the exact time during the personal search when the fighting began, and thereby as throwing, incidentally, some light upon the original intentions of the Indians, I am pleased, nevertheless, to acknowledge my error. Lieut. Hawthorne's summary, however, upon this point, namely, "There remained, finally, the persons of the savages to examine, but this was not attempted until the search was over, and not when the search began," has no meaning, being simply a contradiction. Moreover, I am surprised at his insisting upon this point, while in another place he alleges that, "resistance to disarmament was fully determined on during the night." If such was the case, why did they permit the search to go on? and why did they give up 48 guns before making their rush to escape?

Lieutenant Hawthorne says, "There were, all told, about 300 cavalrymen and 20 artillerymen on the side of the troops and 120 fighting men on the side of the Indians. Lieut. Richardson therefore missed his proportion of four to one by 160 soldiers." Upon this point I quote from the report of the Major-General Commanding, page 150, Report of the Secretary of War, 1891, Vol. I., as follows: "Colonel Forsyth was ordered by General Brooke to join Major Whitside with four troops of cavalry, which with the company of scouts under Lieut. Taylor, made up a force of eight troops of cavalry, one company of scouts, and four pieces of light artillery, a force of 470 fighting men as against 106 warriors then present in Big Foot's band." The same number of Indian warriors is given in General Forsyth's report. I prefer to rely upon these official reports rather than upon Lieut. Hawthorne's memory. Why does my critic omit to count the Indian scouts and assert that

they were sympathetic? Does he know anything about it? I think not. Does he recall the splendid service of the Indian police against their own people in the affair with Sitting Bull? Can he point to a more creditable or loyal piece of work done by any body of men in our Indian history? I challenge him to do so. Lieut. Hawthorne's comments upon American Horse are refreshing if nothing else. How his concise though hackneyed estimate of the value of an *Indian's* lying tongue must appeal to men who have spent 25 to 30 years studying the Indian character!

My critic seems disturbed that in the mere matter of numbers (Indians killed) I should not have been "approximately correct" at least; perhaps because it ought to be so easy to quote properly a simple matter of figures, or ask some one, *well informed* on the subject, to furnish them. He says: "I have sought everywhere for Lieut. Richardson's authority for stating that 185 Indians were killed." If he will take the trouble to obtain the Report of the Secretary of the Interior for 1891, Vol. II., Indian Affairs, and turn to the statistical table on pages 768-69 he will be rewarded. I took the figures from this table, although General Miles gives 200 killed or mortally wounded.

Let me suggest to my critic not to make the mistake of assuming that these others are basing their assertions upon memory and hearsay. Let him look up a few of the published reports upon this campaign himself, and if he questions their accuracy, let him submit his own report of the *true* history and ask that it be recognized.

III.

"Infantry Organization."

Lieut. David J. Baker, 12th Infantry.

IN the July number of this journal is a rather oracular critique by an artillery lieutenant, on the above subject.

Treating of the proposed three battalion-organization for the U. S. Infantry regiments, the gist of his contention is: the reorganization of the infantry is desirable to increase the flow of promotion, thereby lessening hardship to individual officers.

But the three-battalion organization is tactically wrong: because the infantry drill regulations, based on that organization, are undergoing revision; because it has not been demonstrated to him to be the best organization, rather the contrary; and because our military policy may confer in war the leading of infantry regiments on those incapable of handling three battalions.

Theoretical data, where no practical ones are obtainable, are better than none; yet practice, not theory, is the ultimate test of any organization. Several years in command of one of six companies in a battalion of infantry trained in "Upton's Tactics," two years with an Indian company—the largest of infantry in the service—trained in "Drill Regulations," nearly four years with the Illinois National Guard, whose infantry for years has been in regiments of three battalions of four companies each, a distrust of all, and a belief in a very little theory, are the practical bases of what follows.

The army is a governmental machine paid for by the people, not for the benefit of its peasonnel but of the nation. Not sentiment for the individual, but public utiiity—the greatest return for the least effort and cost—ultimately decides its organization, personnel, armament, equipment, instruction, and recruitment. Those of the army who cannot cheerfully accept these facts have the option of testing their abilities and energies in the competition of civil life.

The old infantry organization was unwieldy; did not extract proper work and responsibility from field officers other than the battalion commander; precluded economy of of-

ficers by material increase in strength of companies; and was adapted to conditions which modern armament had killed.

The objection of many infantry officers to the present "Drill Regulations" are: the making of the squads and sections not only disciplinary but tactical bodies, causing too much division of authority and consequent friction in the company; the same faults on a larger scale but to a lesser extent, in the battalion; a lack, especially in the firing drill, of that simplicity required by modern conditions and the short and imperfect training of those to be led in war; the too great dispersion of the fighting line; and the almost mandatory prescriptions of normal battle formations, not suited to the probable terrain of operations.

These criticisms are not incident to or dependent on the three-battalion organization. On the contrary few strictures are heard on the handling of the three-battalion regiment recommended in "Drill Regulations" and amplified in "Organization and Tactics."

Not "spell" but common sense deduction from recent military history is connected with the use of the figure "3." For infantry organizations larger than the battalion, three under one commander give him a strong line of battle; two working side by side under one control; and a third, a reserve, under his control, and capable of most effect. While not proved, it is probable that more cannot be handled by one chief. It is proved that three can be, and give the maximum of effect and economy.

United States history has been characterized by absence of broad and consistent military policy, vitiating even the details of its tactics and organization. The same annals are glutted with tales of useless spending of blood and money due to that lack.

During the Civil War the South, taught the obvious lesson, in permanent, consistent, and effective organization, far outdid the United States. The waste of life and wealth did lower the strength of Federal regiments and raise the capacity of their leaders. That there may thus have chanced accord and resultant strength, is the only solace for the methods of recruitment and organization then used.

The Nation is slowly but surely learning the lesson. The gradual advances of the organized militias of the States towards modern organization, simplicity in administration and instruction, and care in selection of field officers evidence this. And these militias are a surer mirror of popular opinion than the army. The time is passing, if not passed, when political service, not military efficiency, can appoint regimental and higher commanders.

Without military knowledge and capacity an officer is as impotent for good, and powerful for evil, with a small as with a large regiment. In a small war the expanding of the companies, in a large war the brigading of regulars and volunteers together would vastly improve on former methods. Either are facilitated by "the figure 3."

The three-battalion organization was first tried in this country by the National Guard of Illinois. The State now has seven three battalion regiments of infantry. The companies vary in strength from one hundred to fifty men. The regiments, and even the battalions, vary in efficiency. The roster of field officers changes little from year to year; most of the colonels and lieutenant colonels held field officers' commissions under the old organization and "Upton's Tactics." Nothing but praise of the three battalion formation is heard; not even sentimental regrets are wasted on the old.

The captains know that however difficult the situation and close the contact, whether actual with a mob, or simulated in manœuvres, the battalion commander watches them, and they can look for advice and aid to him.

The majors feel that they are measurably independent; that the working out of tactical details is left to them; and that the instrument is largely of their own making, from which results that pride and confidence without which a soldier is a broken reed.

The lieutenant colonel knows that when two battalions are on the line of battle he is in immediate control of them, not a fifth wheel.

Freed of the details incident to immediate instruction and care of the command, the colonel is allowed to develop his capacity to meet emergencies. Be the latter what they may, one battalion, the regimental reserve, is with him; he can use it for final and effective action; he goes in, not impotent but armed with it.

Observed in strikes in which the duties approximated to actual war, in exercises in which the handling of three battalion regiments of infantry over varied ground was practiced constantly and carefully, in recent brigade manœuvres over large extent of close country, the following are facts as to the infantry regiment of three battalions of four companies each:

The instruction of a company being uniform, it makes little difference whether it contain fifty or one hundred men—one hundred and fifty are practicable. The division of the regiment into four company battalions conduces to better care and less fatigue, and thus allows increased effect with diminished effort. In exercises where opponents confronted each other with blank cartridges at one hundred yards, the average battalion chief controlled his four companies, country companies only united a week each year. Six companies of regular infantry have gotten completely out of hand under similar circumstances. Surely this dictates a limit to the companies manageable by a battalion commander.

During the strikes, whether in close contact with mobs, or in the performance of the many and harassing duties of guards and outposts, the three-battalion organization met every requirement. Would the unwieldy battalion of eight or ten companies have done the same?

Many measures are necessary to conform our small and peculiarly situated army to modern requirements: increased enlisted strength of all arms; increased pay for non-commissioned officers; organization of supply and transport corps; improved methods of recruitment; improved instructions of officers and men; reorganization of the artillery and infantry. If officers regard the army as a whole, overlook individual ends, and labor for the common goal, all these are obtainable, regardless of cost or politics.

An infantry officer probably takes as much interest in the other branches as one of their officers does in his; and his consequent knowledge of them is probably as thorough. He accepts without cavil or criticism the claim of the cavalryman that to be efficient the troops of his regiment must be grouped into squadrons; of the artilleryman, that the batteries of his regiment must be grouped into battalions. Why cannot the artillery allow a modicum of the same prerogative to the infantry?

Reviews and Exchanges.

The Army of the United States.*

"THE ARMY OF THE UNITED STATES," being a series of Historical Sketches of the Corps and Regiments of the United States Army, written for the most part by officers identified with the organizations, and edited by Gen. T. F. Rodenbough, U. S. Army and Major W. L. Haskin, 1st Artillery, comes nearer being the ideal reference book on the subjects of which it treats than anything we know of in print. The editors and publisher deserve the thanks of the army and everybody interested in its history for bringing together and putting into convenient shape the historical data heretofore scattered over the pages of the JOURNAL OF THE MILITARY SERVICE INSTITUTION.

The book contains 710 pages of text, has a steel engraving of George Washington as a frontispiece; and at intervals throughout the volume similar portraits of the seventeen Generals in Chief who have commanded the army from 1789 to 1895. Moreover, and though last not least, it has an index, complete, and as far as we have been able to carry our verification correct. The index enhances the value of the work a hundred per cent.

The historical sketches of corps, departments and regiments are arranged as in the Army Register, so that one can turn to any organization readily enough without consulting the index. But the index is indispensable for all that. By its help every person, place, battle, or incident of any kind, mentioned in the text, can be turned to in a moment. By bringing the sketches together and arranging them in the established order of precedence the editors brought them within reach of the student; the addition of the index made the work a valuable and handy reference book.

It would be impossible to give any adequate idea of the scope and style of the several sketches. As a rule every organization has its own chosen historian, and every writer has his own style. But they have all had access to the Regimental Records, and their productions are presumably correct. Moreover the sketches have all run the gauntlet of publication in the Institution JOURNAL, and thus courted the criticism of the army at large. There are few army officers who would not find it convenient to have such a book within reach.

JAMES CHESTER,
Captain 3d Artillery.

A Text-Book of Ordnance and Gunnery.†

In this work we have an outward and visible sign of the course in ordnance and gunnery of the Military Academy. It represents that course as at present constituted, and is therefore a measure of its character. We must, therefore, in forming an estimate of its value, bear in mind that the author has had to keep constantly before him, on the one hand, the acquirements of the pupils for whom he has been laboring, and on the other, the necessi-

**The Army of the United States.* Maynard, Merrill & Co., New York, 1896.

†*A Text-Book of Ordnance and Gunnery.* Prepared for the use of Cadets of the U. S. Military Academy. By Captain Lawrence L. Bruff, Ordnance Department, U. S. Army, Instructor Ordnance and Gunnery at the U. S. Military Academy. New York: John Wiley and Son. 1896.

ties of the subject itself. To write an adequate text-book of ordnance and gunnery is an increasingly difficult task. If all limits be removed, we have a product such as the text-books of the Artillery and Engineer School at Fontainebleau. But if limits must be taken into question, if a special audience is to be addressed, we run the danger of producing a text that may indeed be compressed within reasonable limits of time and of effort to be exacted, but that otherwise will be found wanting in respect of the completeness that is inexorably demanded, if a sure foundation is to be laid.

Now the first class of the Military Academy is a special audience. It has its similar nowhere else in the world. As in other subjects, so in ordnance and gunnery, all of its members take essentially the same course, whether they are to enter the technical or the non-technical branches of the service. We mention this characteristic, not because it is unknown, but simply because in our service, it adds to the other difficulties under which must necessarily labor the author of a general treatise on ordnance and gunnery. Of two cadets graduated, one may never again solve a ballistic problem, the other may do nothing else, but both will have had the same foundation.

No effort, then, is needed to realize the delicacy of the problem: we must have a course, and therefore, a text, that will properly tax the best men of the class without overtaxing the worst and that at the same time shall serve as an adequate foundation of both.

The Academy, and through it the service, is to be congratulated on Captain Bruff's solution. His text rests squarely on the work of the first three years of the cadet. The transition is made without any breach of continuity whatever. Moreover it brings into play all the related subjects that the cadet has been studying. A similar assertion could not have been made fifteen years ago, because then it would have been conspicuously untrue. Here, then, from the point of view of mental discipline and growth, we mark a distinct advance. Another distinct quality is what may be called the suggestiveness of the text. The inquiring reader will find in certain parts of the work what we may call a note of repression; he will recognize that the development has been carried on only so far as is compatible with the limitations of the Academy. This very fact constitutes a spur to further effort. It is admitted readily that this statement may be made of other courses of the Academy. But a world of difference is implied in the reflection that the course under review is a military course. So here again we record an advance, for surely no one will maintain that a few years ago, the Department of Ordnance and Gunnery of the Academy contained any such element of suggestiveness as we are here speaking of. And if we turn to the non inquiring members of the class, to whom any suggestion of ulterior work is odious, we may dismiss them at once with the remark that a good deal more than mere memory-work will be exacted of them. That is to say, bearing in mind the quality of the work to be done, the two great elements of which every class at the Academy is formed, the labor-loving and the labor-saving will both find their best energies fully taxed.

Captain Bruff's book considered merely as a text-book, is distinguished by concentration and consolidation. The attention of the cadet is not distracted by passage to one subject before another has been adequately treated—a characteristic the importance of which is not to be overvalued. We may best illustrate by taking up the matter of the work in some detail.

For example, the first chapter deals with gunpowder and interior ballistics (pp. 1-104). Before leaving it, the cadet will have been made acquainted with the main results of modern research upon these subjects. And these results are brought out, not so much from a merely academic point of view, as from a working point of view. The advantage of this feature needs no comment here. To "High Explosives and Smokeless Powders" but thirty odd pages are devoted. The main properties of the principal types are explained and the reactions of explosion written. It is possible that

some will look upon this portion of the work as incomplete. And so it is, from a special point of view. But high explosives constitute a highly specialized subject, and we may add, one as yet not thoroughly worked out or understood. An extended treatment would therefore be out of place in a text-book for beginners,—and in our opinion, Captain Bruff's self-imposed restriction is wise. Chaps. III. (pp. 136-278), IV. (pp. 279-327), V. (pp. 328-346) deserve to be spoken of together, for together they make up nothing less than a treatise on modern artillery. Logically, Chap. X. on machine and rapid fire guns, should follow here, but the author has preferred to make a separate subject of them. Setting out then with the definition of gun-steel, its manufacture is briefly but clearly explained, and some account given of the machines used in gun construction. After taking up this latter subject, we pass to the elastic strength of guns, Lamé's laws being reached as soon as possible, limiting values of strains and stresses deduced, and application made to a compound cylinder of two cylinders. This restricted application is ample in a cadet course. The point of view throughout, is again a working point of view. Wire guns are relatively merely mentioned, the remainder of the chapter being given to measurements and to descriptions of the constituent parts of typical guns, and of the guns themselves. From "guns" we go naturally to "Projectiles and Armor," and then to "Fuses and Primers." These subjects are more briefly treated. But the scope is nevertheless broad enough to include rifling, manufacture of both armor and plates, and penetration. We should have been glad to see some notice taken of Weaver's formulas for penetration. On Chapter VI. we need not dwell, as it is in the main a summary of the leading parts of Captain Ingalls' well-known work on that subject. Chapter VII. (pp. 388-465) describes thoroughly all our service carriages, old and new, existing and to exist, and gives the usual theories of recoil. Chapter VIII. (pp. 466-527) takes up "Pointing and Probability of Fire." This is one of the best chapters in the book. The difficult subject of probability of fire has been stripped of all the divagations that, however interesting to the specialist, serve only to confuse the beginner, and we have instead a plain and clear statement of principles, fully illustrated, and resting solidly on the mathematical basis of the subject. The remaining chapters of the book discuss small arms, rapid fire and machine guns.

The whole work is therefore an exposition of the mathematical basis of the artillery science of the day, joined 1st, to full description of our own material, and 2d, to such descriptions of foreign types as are needed to round out the subject. But the book itself is only part of the course; wherever it is possible the things described, whether guns, instruments, machines, projectiles, are made elements of the course. The cadet is given the freest possible access to the war implements that form the subject of his studies. He uses them, handles them, grows familiar with them by actual contact. It is of this sort of work that the book under notice, is an outward and visible sign. We do not fear to repeat, therefore, that the Academy, and through it, the service, is to be congratulated upon Captain Bruff's work, upon the results as published, and upon the results that translate themselves by a higher standard in the service.

The publishers have given the book a handsome dress; the paper is clear and the equations stand out. There is a good index, and the illustrations are numerous and excellent. But these material advantages have been secured by a price that is almost prohibitory.

D. De W. W.

Cavalry Studies From Two Great Wars.*

This volume, the second one of the series edited by Captain Wagner, consists of three

* *Cavalry Studies from Two Great Wars.* International Series No 2, Edited by Captain Arthur L. Wagner, Sixth Infantry, U. S. A. Published by The Hudson-Kimberly Publishing Co., Kansas City, Mo.

monographs by Lieut.-Colonel Bonie, 11th Dragoons (French Army), Major Kaehler, of the Great General Staff of Germany, and Lieut.-Colonel George B. Davis, U. S. A. (formerly Captain 5th U. S. Cavalry). The first study deals with the tactical use of the French cavalry up to Sédan; the second with the German cavalry at Vionville and Mars-la-Tour; and the last, with the series of cavalry operations on the part of the opposing cavalry corps under Pleasanton and Stuart, leading up to and including the battle of Gettysburg.

In "The French Cavalry in 1870, with its Tactical Results," Colonel Bonie presents a graphic picture of the backward condition of the French cavalry at mobilization, and of the subsequent mistaken employment of the cavalry forces throughout the campaign.

The commissariat stores were empty, and the army of France deficient in mess-tins, cans, kettles, and other necessaries. Requisitions on Paris for supplies remained unfilled until the army was obliged to march without them. Even the ambulances were not in working order. The mobilization, too, was executed so unsystematically, and subjected to so many delays, that while the French actually believed that their army had two days start of the German forces, the latter were at the time, already on the frontier. Such, too, had been the thorough preparation of the Germans, that they knew France better than the French; while the latter, incredible as it may appear, seemed, in the preliminary operations at least, not to possess a single accurate road map.

Under "Preliminary Operations," Colonel Bonie speaks of the unparalleled audacity of the German cavalry,—"like an irritating fly that is driven away, only to return the next moment, the enemy's cavalry could not be laid hold of." Indeed, the German cavalry showed "from the first, an unlimited confidence in the dash of their men, and the staying powers of their horses."

Continuing, the writer criticises the splitting up of the cavalry forces into divisional cavalry, attached to infantry divisions; and the consequent confusion, due to a division of authority. This misuse of the cavalry,—each infantry division being covered by its divisional cavalry, led of course, to numerous breaks in the continuity of the advanced cavalry, which in the front of the German army corps on the contrary presented an impenetrable front. "From the right to the left, every portion is in communication; * * * as soon as contact with the enemy is established, it is never again lost."

The writer describes in an entertaining manner, the part taken by the cavalry, in the battles of Wissembourg and Woerth, concluding his remarks with this emphatic criticism: "Thus terminated the first attempt to employ our cavalry on this campaign. The result of these charges, undertaken without proper forethought, was bloody and useless, as we were thrust forward into the open against an enemy always out of reach, and often out of sight."

The frequent mistakes of the French cavalry in charging over unknown ground, is thus mentioned: "On both occasions the bravery displayed was extreme; the results *nil*. They started without knowing the object of the charge, and advanced without reconnoitring the ground in front of them, and, after losing heavily, fell back without having an opportunity of using their arms."

In the employment of the cavalry at Woerth, there was all possible dash, but want of skill in the use made of it. The cavalry charges were futile, except in their object of saving the infantry, and to do this, three times as many horses and cavalrymen were lost as foot-soldiers were saved.

Here occurs almost the only criticism the writer makes of the employment of the hostile cavalry: "But the Prussians committed the terrible mistake of not employing properly their numerous and excellent cavalry, and this want of activity after the battle of Woerth, which arose, perhaps, from being unaware how great a victory they had obtained, allowed Marshal McMahon to save the remnants of his disorganized force."

In the subsequent retreat to Châlons, Colonel Bonie complains of the inactivity to which the cavalry was subjected: "Instead of sending us," he says, "out as far as possible, we were massed in divisions of five or six regiments together, and hampered with a baggage train; we never sent out a scout or vidette, but were content to follow the main roads, and simply accomplish the march. In short it was a mere trial of speed, in which our only thought was to escape being cut off."

It is not to be wondered at, then, that all this mismanagement produced demoralization. "The earth was so soaked that our picketing pegs had no hold; we had neither shelter nor straw to sleep on, and, owing to the heavy rain, we could neither light fires nor dry our clothing. The horses were equally miserable, * * * our rations never came up until a late hour, and were then generally short in quantity."

In the following description of the retreat upon Metz, the first mention is made of the use of dismounted cavalry, already found so valuable in our War of the Rebellion: "Two squadrons of this regiment, (the 12th Dragoons at Spicheren) were accordingly dismounted, and * * * opened fire on the heads of the advancing columns. Having succeeded in checking their advance, they remounted and charged the enemy, whom they repulsed. After this brilliant feat of arms, they retired behind the line of railway."

Continuing, a detailed description of the difficulties which beset the army in this retreat is given, special attention naturally being paid to Rézonville,—"first, the charge of the French Lancers and Cuirassiers on the Prussian infantry, in which the former were well-nigh annihilated; and second, the famous charge of Von Bredow's brigade upon the Sixth Corps."

In his observations on the tactical employment of the cavalry at Rézonville, the writer mentions the following mistakes by the French: "Charges begun too far off; no squadron videttes sent out; unbroken infantry attacked; regiments surprised while forming; attacks entered upon without supports; the danger of opposing light cavalry to heavy; want of unity in the general command, there being no general-in-chief for the cavalry."

The cavalry had little to do at Gravelotte, and with the blockade of Metz, the cavalry became an encumbrance. Little by little the cavalry melted away; the horses were killed for food, and forage became so scarce that the suffering cavalry horses actually ate each other's manes and tails, until so many troopers were dismounted that scarcely two mounted squadrons to a regiment could be mustered.

"Thus vanished," says Bonie, "this numerous cavalry that we have pictured so brilliant as regards courage on the battle-field. Better had it perished altogether on the field where it had fought so well. At least it would not have survived to undergo a degradation worse than death itself—capitulation."

From Châlons to Rheims, and from Rheims to Sédan, marched McMahon's army, after Bazaine's capitulation, and again we find the same mistaken use of the cavalry. "We shall find the cavalry generally marching either in unwieldy masses or else reconnoitring the opposite flank to that where the enemy was; always full of dash when called upon to charge, always wanting when called upon to reconnoitre and establish contact with the enemy." And again, "the Germans employed their cavalry in a different manner, and pushed on their scouts to enormous distances ahead. Those who preceded the army coming from Stenay were twenty-four miles in advance, and were to be met with beyond the defiles of the Argonne. On our arrival they fell back slowly, and only when they had ascertained our force."

A telegram from the Minister of War recalled McMahon and his army from Chene Populeux to the aid of Bazaine; but there was ever the same unceasing surveillance of the French army by the German patrols. "The further we advanced the more frequently

we encountered the enemy's cavalry. At first videttes and small parties of five or six continually appearing and disappearing, but always out of reach. Their duty was not to fight, but to watch continually, and this rôle they carried out to perfection all through the campaign."

The battles of Buzancy and Beaumont followed. In the first, due to the neglect of the French cavalry to reconnoitre a wood near Beaumont, in which Prussian artillery and infantry were concealed, the Fifth Corps were nearly decimated. "A Prussian officer who was present at this scene afterwards told one of our wounded men that our blind confidence created a great impression. From their point of observation they could see both officers and men making themselves comfortable, washing, cooking, talking, laughing, and singing,—the whole without the least suspicion of who were near them. * * * About eleven o'clock, in the middle of the tranquillity, whilst some were resting themselves and others were cooking, out burst a storm of fire, and the bivouac was riddled with shot and shell."

And then Sédan! "We have but few words to add to complete the history of the cavalry on this campaign. It is with gloomy sadness that one continues this recital, for the last drops in the cup are the most bitter."

Slowly the doomed army was encircled, as with a band of iron, and the brave French regiments, who encountered death so fearlessly in their efforts to break it, were hurled back, only to suffer the pangs of hunger and thirst.

And then the surrender!

The feelings of France at that time,—and the feelings of the French people are not materially changed now, are embodied in Colonel Bonie's pathetic conclusion: "After the dreadful disasters that France has undergone, our hearts can have but one thought, one ambition,—that of restoring and avenging our country, which has been so cruelly humbled. Let us then take for a motto, 'Courage and confidence in the future,' for it will most certainly give us a splendid revenge."

The second study,—"The Cavalry in the Battles of Vionville and Mars-la-Tour," by Major Kaehler, is a more detailed account of the operations of the cavalry forces in these battles than that contained in Colonel Bonie's monograph. While perhaps not so graphic a picture of these exciting events, it has the studied accuracy of the German character in every word, and is very complete.

In the movement of the 14th Prussian Cavalry Brigade before the plateau of Vionville there occurred an instance of an order being received by the brigade commander too late to be considered practicable, and, in the face of being charged with disobedience, the decision of the commander was, not to carry the order into effect,—due to the changed conditions. Such cases must occur on every great battle-field, and although a dangerous precedent, the judgment of the Prussian generals seemed faultless.

Concerning the charge of General du Preuil on the unshaken Prussian infantry, already referred to in Bonie's account of Rézonville, the German account says: "The Second Battalion of the 52d Infantry Regiment awaits the charge in line with arms at a carry; at 250 paces a rapid fire begins, against which the enemy's blow shivers impotently. But other swarms of horsemen pass the little band on the right and left, the rear rank face about and fires into the enemy from the rear. * * * Far and wide the field is covered with dead and wounded; only a small band of these cuirassiers, who charged with such superb courage, succeed in escaping destruction by hasty retreat."

The following occurrence at Vionville shows the steadiness of even the youngest Prussian troops under fire: "The regiment was then assembled by the regimental commander (17th Hussars) within effective fire of the enemy's infantry fire from Rézonville, on which occasion, as a matter of instruction for the young troops in their first charge, the

formation and dressing were effected, front toward the enemy, the same as on the drill ground."

Concerning the much discussed charge of Von Bredow's brigade, which Bonie describes as "annihilated," and which French writers have named the "Death Ride," Kaehler makes the following comment: "This was the result of the 'Death Ride' for our lines: Those of the enemy had been broken through; his batteries, in spite of their well aimed fire, had been cut down; his own horsemen, five-fold superior to the Prussians, fresh, and who could only have had to do with the rinsings of this wave of horsemen had to be reformed and withdrawn to the bottom of Gravelotte, a half a mile from the field of battle."

And so this interesting account continues, the article closing with a statement of the cavalry losses, as compared to that of the army as a whole. "The Prussian losses were as follows: * * * One officer was killed to every 10 men; in the grand total 1 officer was killed to every 15 men. * * * The total strength of the Prussian forces engaged on the 16th of August amounted to 67,000 men, of which 10,780 horses formed about the sixth part. The cavalry therefore bore its full share of the losses of the day. These losses amounted altogether to 640 officers and 15,170 men; of the cavalry, 96 officers and 1425 men. In the total losses, therefore, there was one cavalry officer to every six officers lost, and one horseman to every ten men lost."

Seven years before the events described by Bonie and Kaehler, occurred the Gettysburg campaign; and it seems very strange, indeed, that the screening and reconnoitring duties during this great campaign (not to speak of the use of the cavalry at other times during the War of the Rebellion) were not seized upon and studied with more intelligent appreciation of their worth, by the warlike nations of Europe. "The performance of similar duty by the German cavalry," says Captain Wagner in the editor's preface, "astonished Europe as with a new discovery in war."

Colonel Davis' intensely interesting study of "The Operations of the Cavalry in the Gettysburg Campaign," in which he presents the *strategic* use of the cavalry, shows how perfect was the conception of the modern duties of this arm, by both the Union and Confederate generals.

Starting from the position of the armies of Hooker and of Lee after the Chancellorsville campaign, confronting each other on either side of the Rappahannock, Colonel Davis follows the armies in their general movements,—at the same time bringing in relief the part taken by the splendid cavalry corps on each side.

From his position south of the Rappahannock, Lee took the initiative, and his first objective was Culpeper Court House. Stuart's cavalry covered the movement. In order to discover Lee's intentions, Hooker directed Pleasanton to make a reconnoissance in force towards Culpeper; but the mistake was made of hampering the cavalry in this movement which required extreme mobility, with two brigades of infantry. Pleasanton's cavalry commanders,—Buford, Gregg and Duffie, encountered Stuart's forces at Brandy Station, and although neither side gained a decisive victory, the object of the reconnoissance in gaining authentic information of Lee's movements, was effected. But still more,—"it had shown, however, that such information was to be obtained by a bold, well-directed and energetic quest. It was an object lesson, however, in a new strategical employment of the arm, which the leaders of the Federal cavalry were not slow in learning."

Colonel Davis adds: "One result of incalculable importance certainly did follow the battle—it *made* the Federal cavalry. Up to this time confessedly inferior to the Southern horsemen, they gained on this day that confidence in themselves and their commanders

which enabled them to contest so fiercely the subsequent battle-fields of June, July and October." (McClellan's Campaigns of Stuart's Cavalry.)

Lee's second objective was the fords of the upper Potomac. In this movement, besides using the ranges of mountains to screen his columns from observation, Stuart's cavalry, under Fitz Lee, Robertson, and W. H. F. Lee, masked the march of Longstreet's corps, and later on, held the important gateways of Aldie and Thoroughfare Gaps, in the Bull Run Mountains.

Pleasanton proceeded towards Aldie with Buford's and Gregg's division, detaching Duffie with a single regiment to make a detour by way of Thoroughfare Gap. The results of these cavalry movements were the battles of Aldie, Middleburg, and Upperville. "Pleasanton's success," says Colonel Davis, "in the engagements, had been most encouraging; the more so, as they were calculated to inspire both officers and men of his command with confidence in their capacity to cope on equal terms, with their redoubtable adversary. * * * Partly from the observations of his scouts, and partly from the stubborn character of Stuart's resistance, he had ascertained the general fact that the mass of Lee's infantry was moving northward through the Shenandoah Valley."

Lee crossed the Potomac at Williamsport on June 26th, and two days earlier "Stuart set out on his famous detour to reach the Confederate right, between York and Harrisburg, in Pennsylvania." In regard to this bold march, the writer says: "This bold ride of Stuart has been much discussed. In the opinion of military men, it has always been regarded as a useless and unwarrantable, though brilliantly-executed undertaking."

Commenting on the selection of the strategic position of Gettysburg, Colonel Davis says: "In the light of what is now known, it seems to me that there can be no escape from the conclusion that General Buford is fully, completely, and beyond all manner of doubt, entitled to the credit of the selection."

The desperate fighting by Merritt's and Farnsworth's brigades at Little Round Top, the gallant but useless charge of Farnsworth's brigade, in which the latter rode to his death, the grand attack on the Union centre by Pickett, and the hard fought cavalry battle on the Federal right, between Gregg and Stuart, bear evidence of the important part taken in this great battle, by the cavalry.

The volume containing these three valuable monographs will be an important addition to military libraries; and the attractive appearance of the book, the clearness of the type, and the reasonable price, will doubtless cause it to have a ready sale among the officers of both the regular and reserve services.

CHARLES D. RHODES,
2d Lieutenant, 6th Cavalry.

The Trial of the Iron Plate at Indian Head.*

This is a small pamphlet of eleven pages, with illustrations added, referring in a brief summary way to the ballistic test of the Carnegie reforged 14-inch Harveyed plate which took place at Indian Head in September last, comparing the performance of this plate with a test of a 11.8-inch Krupp plate at Meppen in March, 1895, and with the test of some thin (3.9-inch and 3.1-inch) Krupp plates at Meppen in October, 1895.

The author thinks that Americans have over-estimated the strength of the new process Carnegie armor and that it is inferior in resisting capacity to the new process Krupp armor.

He says, in effect, that if a Krupp plate of 14 inches thickness had been fired at side

* *The Trial of the Iron Plate at Indian Head*, September, 1895, and Krupp's Trials of 80-mm. and 100 mm Armor-Plates at the Proving Grounds near Meppen, October, 1895. Extract from an article by Captain J. Castner, first published in *Stahl und Eisen*, April 1, 1896.

by side with the Carnegie plate it would have permitted perforation only under an impact of 2297 f.s., whereas the Carnegie plate yielded under a striking velocity of 1772 f.s.

This assertion is based upon the showing of the 11.8 inch plate referred to above.

Such a comparison of plates can hardly be termed scientific. It is difficult enough to draw comparisons between plates of the same thicknesses attacked under precisely the same conditions, and when one essays to venture out into such a sea of conjecture as is evidenced in this pamphlet, disinterested persons are apt to look upon it as an advertising effort. There is no doubt whatever that the Krupp works make a very high grade of armor, but it has not, as a rule, up to the present time, shown itself to be superior in any respect to the best French, English or American armor. Since 1891 America has shown the way in armor; the use of nickel and the face-hardening method are distinctly to be credited to the efforts of our Navy Department.

It is impossible to go into statistics in the limits here allowed, but it may be remarked that, apart from the cracking of the *Iowa* plate, it gave as high resistance as any plate of its dimensions has given when subjected to an attack of equal power. In regard to the cracking, attention should be given to the fact that it was a taper plate, its thickness being 14 inches for 4 feet from its top, thence tapering to 7 inches at the bottom. It is well understood that these tapering cross sections give rise to internal strains in the plate during the fire hardening process and therefore cracks are more likely to form than in a plate of uniform thickness. The *Iowa* plate was attacked with two 10-inch, one 12-inch and one 13-inch projectile almost along the line where the taper begins; it should not be expected that this plate under such an attack would come up to the standard of a uniform 14-inch plate, yet it did, fully. The cracking referred to is seen, too, in the 18-inch *Indiana* plate of the Bethlehem Company tested at Indian Head May 19, 1894; this plate was attacked along the taper-line by two 12-inch projectiles and, like the *Iowa* plate, developed horizontal and vertical cracks.

The *Army and Navy Journal* of June 6, 1896, refers to a test of a 12-inch reforged Carnegie plate at Indian Head on June 3d. "The primary object of the test was to ascertain what A. P. shells could do against plates of the double forged character." The 12-inch plate was attacked by a 12-inch Wheeler-Sterling projectile with a velocity of 1800 f. s. It struck the plate in the upper right-hand corner. The shell broke into fragments; a section of the plate was knocked off; a few fragments of the shell got through and fell behind the target. In view of the high character of the Wheeler-Sterling projectiles this is a most creditable performance for the plate, especially so as it was considered below standard, having been rejected by the naval inspector because of defects.

The plate received about 19,000 foot-tons of energy and practically would have kept the projectile outside a ship. Heretofore 12-inch Harvey armor has been perforated by about 18,000 foot-tons striking energy under the same conditions of attack.

At the same time an 8-inch reforged plate (Carnegie), which had also been rejected because of defects, withstood the standard attack of an 8-inch shot, the plate showing only a back bulge as the result. The bases of projectiles fell entire in front of plate. That is, the plate withstood with insignificant damage about 5600 foot-tons of energy. Heretofore 8-inch Harvey plates have been completely perforated by an 8-inch projectile striking with about 5800 foot-tons energy.

These trials amply confirm previous tests and show clearly that we do not over estimate the strength of the armor which is being prepared for our warships. Nothing better has appeared in Europe it is believed.

E. M. W.

Publisher's Department.

CONTINUED Progress and Enterprise.—It is interesting to note continued progress and enterprise on the part of American manufacturers. Armour & Co., Chicago, always foremost in the line of better utilization of by-products, are now producing at the Armour Soap Works, Chicago, of which they are the proprietors, an assortment of soaps of exceptional merit.

Provided, as they are, with unequalled facilities for obtaining raw material, and a factory equipped with the most modern machinery, directed on progressive, scientific methods, it is to be expected that a new standard will be established for high quality in soap.

Armour's White Floating Soap is especially adapted for use in Bath, Toilet and Nursery. It leaves the skin soft and bland.

Armour's Family and Laundry Soap, for household uses, show a distinct advance in quality and general utility.

Armour's Washing Powder is quick acting, harmless and economical.

* * *

Nourishment for All.—There has long been a lack of a preparation that is a rousing tonic, a flesh-builder and a vitalizer. Hundreds of attempts were made, but all fell short. None contained the great nutriment that is necessary. Anheuser-Busch's Malt Nutrine is a food drink accomplishing the desired result.

It is strong in the unadulterated nutriment properties of malt and hops.

If there is any principle of Hygiene established beyond the possibilities of a doubt it is that which designates the mother's milk as the best nourishment for her offspring. But the mother must be in normal health. This is a positive principle.

Appropriate aliment for the young is supplied direct from nature's laboratory without outside contamination, and it is in the best form for digestion and assimilation.

The quality and quantity of cow's milk depend largely upon her food and the healthfulness of her surroundings. It is just the same with the mother's milk. The mother is taxed with the support of two human beings. The indoor seclusion rendered unavoidable by the duties of maternity, impairs and weakens her digestive powers to such an extent that she must have special nourishment to enable her to meet the responsibilities of motherhood. For this purpose she needs some form of food that does not overtax the digestive organs, and at the same time can be readily assimilated.

The extract of malt comes to our rescue, but as many of the preparations now on the market contain alcohol in large proportions, which injuriously affects mothers' milk and renders it unfit for the infant's use, it is necesary to exercise judgment in the selection of a suitable preparation.

In Anheuser-Busch's Malt Nutrine none of the objectionable features are found. It is in every sense the food best adapted to overtaxed digestive organs. It is not only a food, but a tonic and digestive agent which is thoroughly capable of meeting the requirements, not only of nursing mothers, but of consumptives and sufferers from wasting diseases, in fact, all who need nourishment and strength.

Malt nutrine can be obtained at druggists and grocers.

* * *

An Ideal Factory.—In selecting a site for a factory, the comfort of the employés is not always the first thing that those who invest capital provide for. Factories are, as

a rule, built and equipped for the purpose of making money for the investors, the comfort of the employés and their welfare generally is a secondary consideration. These facts impressed themselves upon one of our staff last Saturday as he journeyed on an electric car through the beautiful scenery which lined the way from Springfield, Mass., to the Overman Wheel Co.'s factory. If President Overman had searched this entire continent all over he would not have found a place so lovely in its surroundings, so healthy and convenient for the employés and so far remote from the regulation factory conditions.

Imagine a magnificent pile of bricks and terra-cotta erected in the very highest style of architecture, and placed in the midst of a beautiful garden, with all manner of trees in bloom and blossoming, everything maintained in the neatest possible manner, and you have a fair picture of Overman Wheel Co.'s plant. The president of the company is not a hard master, but he is a just one, and the fact that hundreds of his employés have worked for the company for several years is an acknowledgment that the treatment accorded the Overman workman is first class.

We have spoken of the Overman factory as one of the best conducted, best fitted up and one of the prettiest—if not the prettiest—in America. It seems almost sacriligious to have a factory in this beautiful spot—the highest point in Chicopee Falls. It is a place where a man would work in preference to most places. It is a place where a family could be taken care of and brought up in better style and at less expense than in most other places ; so it is no wonder that among the employes can be found responsible men with families who appreciate the surroundings of the Overman factory. The factory furnishes labor for from twelve to fifteen hundred employés. The factories are provided with large workrooms with high ceilings, which are all well lighted and well ventilated. The broom and the scrubbing brush are familiar implements for dirt destruction in the Overman factory. Every safeguard is used to prevent accidents and in parts of the factory where there is much dust an exhaust system for removing it is used which also thoroughly ventilates the room. In cold weather the rooms are warmed by fresh air drawn from the outside and reduced to the proper temperature by passing over steam pipes. The air is propelled through the building by fans driven by special engines. Pure running water from artesian wells 250 feet deep is provided in every room.

The dressing-room system with individual clothes-press is provided in the basement of each building. A few minutes before the men enter the dressing-room the basins are filled with warm water, and soap and towels are provided. A janitor looks after this arrangement. Fire escapes are provided and the factory is fitted with sprinklers, which are discharged at a certain temperature.

Conspicuous all over the factory is posted the following : "No employé is required to work where he is in danger of life, limb or health. We do not intend to ask employés to work where we would not be willing to work ourselves and all employés are instructed to send written complaints to the office, where, in their opinion, there is any possible danger from machinery or surrounding parts of the mill. It is particularly desired that great cleanliness be observed. The coöperation of employés will add to the comfort of all concerned." In the following regulations Mr. Overman's methods are fully illustrated. There is a ring of true Americanism there also. They are as follows : "Boys under 18 years of age will not be employed." "*Aliens under 21, who cannot read or write the English language, will not be employed.*" "Smoking will not be allowed." "Men will keep their machines clean and put tools in their places." "Men found under the influence of liquor will be discharged." "All profane and obscene language will not be permitted." "The greatest cleanliness will be required in all departments." "Do your level best. You cannot afford to do otherwise." "The man who does the best is sure to win." "Time killers are dropped first when work is slack."

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Changes of address should be reported promptly.

Announcement.

IN accordance with the rules and regulations adopted by the Institution regarding the submission of essays in competition for the annual prize, those for 1896 are required to be in the office of the Institution on or before September 1st.

Up to the time of going to press the following essays have been received: "Fantassin," "Cincinnatus," "Dux," "Nantan," "Excelsior," "Valley Forge," "Domine Sum," "Tentanda Via Est," "Reinhard."

Notice.

THE attention of the readers of this Number of the JOURNAL is respectfully invited to page 406(b), colored page.

JOURNAL

OF

THE MILITARY SERVICE INSTITUTION

OF THE

UNITED STATES.

"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."—SHERMAN.

VOL. XIX. NOVEMBER, 1896. NO. LXXXIV.

THE HUNTING KNIFE AND INDIVIDUAL RIFLE PIT.

BY MAJOR J. P. SANGER, INSPECTOR GENERAL.

SIX years ago on the 1st of last March it was officially announced from the Headquarters of the Army that the hunting knife would replace the Rice trowel bayonet, and this was gradually done. An entrenching tool had been designed and manufactured by the Ordnance Department, but with the appearance of the hunting knife, which was to answer all purposes, the official existence of the entrenching tool was cut short, although neither of those implements was in general use when the trowel bayonet was abolished. Shortly after the adoption of the knife bayonet, the hunting knife was officially discontinued, as in the opinion of the Chief of Ordnance, it was thought "to fulfill all the requirements of the hunting knife." (See Annual Report Chief of Ordnance, 1895, p. 57.)

A few trials of the knife bayonet as an entrenching tool while confirming the opinion of the Chief of Ordnance, has resulted in such injury to the bayonets that a return to the hunting knife now seems probable, and it is the object of this paper to invite attention to this implement and its use in connection with the individual rifle pit.

The battle experience of the past thirty years has culminated in the extended or individual order as the only practicable formation of infantry for battle. This order of fighting, although

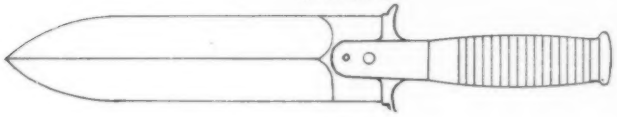
treated by some military writers who should know better, as something new, and attributed by them solely to the introduction of rapid firing arms, is by no means a novelty in our army, in which it had its origin more than a century ago, and was the natural manifestation of the habits of our people called suddenly into the military service and unaffected by long courses of drill and discipline. In fact it may be said that the individual order is in accord not only with our military experience but with the characteristics of Americans as a people accustomed to shift for themselves under all circumstances, and thus trained to habits of independence and self-reliance, both of which are indispensable attributes of infantry soldiers deployed in this way.

In all armies where the art of the engineer has been appreciated and properly developed, the character and arrangement of field entrenchments have conformed more or less to the tactical formation of the troops. This has been especially the case in respect to hasty cover, which, rising from the ground occupied, has taken the form of a continuous line, or of small pits or trenches large enough to hold a group of four or five men, according to the formation adopted at the moment. If we apply this principle of military field engineering to the individual order of fighting infantry, and remember that one soldier under cover is equivalent to four in the open, but that cover to be of the slightest use, must be obtained four times as rapidly under the fire of the breech-loader as under the fire of the muzzle-loader, the importance of some official modification of the prescribed methods of protecting infantry is apparent; and the Individual Rifle Pit is suggested as fulfilling the desired tactical requirements.

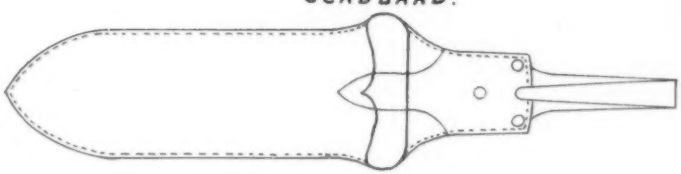
Although the individual rifle pit was resorted to on some occasions by our skirmishers North and South during the recent Civil War, it does not appear to have made much impression on American book writers, probably because our drill regulations have not been of a character to suggest it, and consequently engineering text books of this country, while describing many different forms of infantry entrenchments or shelter trenches, make no provision, as far as can be discovered, for individual rifle pits.

It is proposed that the rifle pit suggested be dug with the hunting knife, which will thus fulfill its purpose as an entrenching tool as well as a knife, and in order to embrace both uses under one designation it is recommended that the knife be officially known as the "Entrenching Knife."

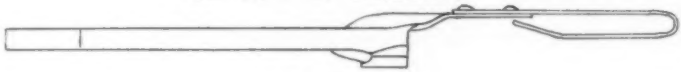
KNIFE.



SCABBARD.



SIDE VIEW OF SCABBARD.



FIGS. 1 AND 2.

THE KNIFE.

This knife was adopted on the recommendation of the late General Sheridan as a necessary part of the equipment of the soldier on the western frontier. It is of steel. The blade is $8\frac{5}{16}$ inches in length and 2 inches in width, and with the scabbard weighs 1 lb. 3 oz. The scabbard is of black leather and is secured to the belt by a flat brass hook. Figs. 1 and 2.

THE INDIVIDUAL RIFLE PIT.

This pit is supposed to be constructed under fire, and is intended to protect the head and trunk of the soldier from direct fire. For this reason no more earth should be removed at first than is necessary for that purpose. When completed the bottom of the pit *should slope up from front to rear* until it intersects the ground line about the thighs and the pit should be just large enough to receive the trunk; the sod and earth removed will

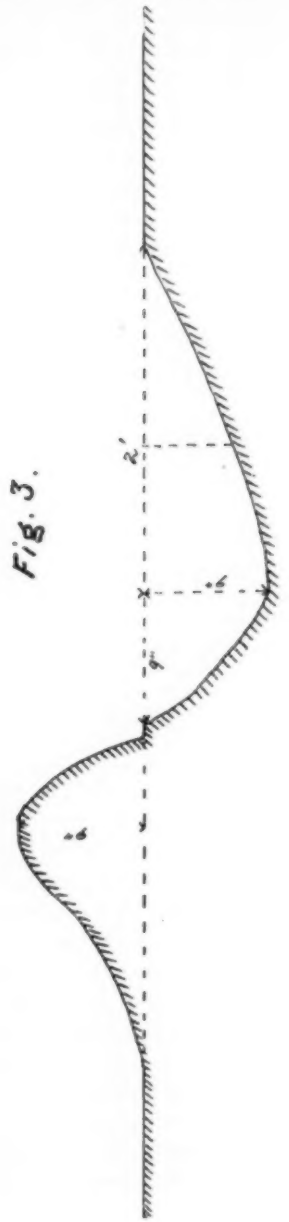


Fig. 3.

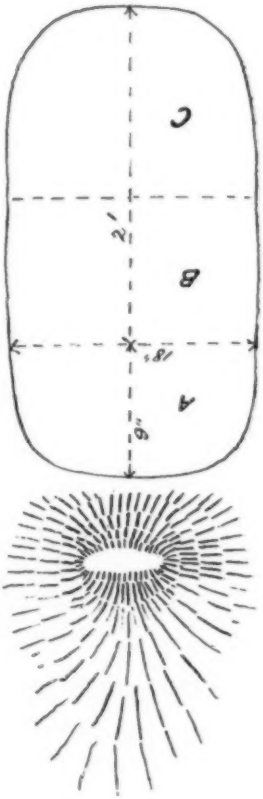


Fig. 4

protect the head; the legs are not supposed to be covered. Figs. 3 and 4.

The upward slope of the bottom is an important feature of the pit and should be preserved in any event, so that if the pit be abandoned or captured it cannot be turned to sudden account by the enemy as would be the case were the pit constructed in the form of a hole or trench.

TO USE THE KNIFE.

Drop on the knees and lie down as prescribed in the School of the Soldier, Infantry Drill Regulations. Rest the rifle on the ground bolt handle up, butt to the rear, near the right side just beyond the traced line of the pit, as shown in Fig. 3. Draw the knife and describe with point and cutting edge the arc of a circle having a chord equal to about the breadth of the shoulders. If the ground be covered with sod, sink the knife deep enough to effectually pass through it. In the same manner make the cuts indicated by the cross lines in Fig. 3. Pass the knife quickly under the sod and turn it over to the front and at once use the knife as a pick to loosen the earth. This done seize the knife with both hands and use it to push the earth over the sod, commencing work in Section A and gradually working back into B and C.

If the fire of the enemy be inaccurate or not severe the pit can be better and more rapidly dug in a kneeling position and the knife used as a scraper to pull the earth forward. For this purpose the soldier should place himself quickly in front of the pit facing the rear, but not until *after the sod is removed and the earth loosened.* If desirable, and opportunity offers, the pit can be deepened and lengthened so as to receive the entire body.

With a little practice in light soil an able-bodied, active soldier can cover himself in three minutes. Although this pit is designed to simply afford cover from direct fire to the head and body as far as the thighs, if the interval between infantry on the firing line be taken at 1½ yards, the pits afford mutual protection against oblique fire. The word cover is used in this article not so much to convey the idea of protection against penetration, as concealment, although in some soils it would include both. The use of the pit and the concealment it affords are shown in Figs. 5 and 6. The soldier should lie on his left or right side, according as he is right or left handed, and fire from the side of the

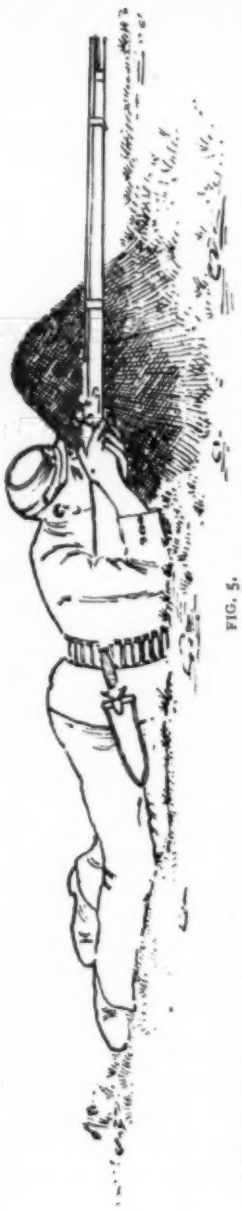


FIG. 5.

pit. No attempt should be made to fire over the earth pile, although this is frequently done, the soldier lying either prone or on his side.

I may add, in conclusion, that during an inspection of Fort Lewis in 1889, I found five companies of the 6th Infantry there stationed equipped with the hunting knife, and on inquiry learned that they had received no instruction with it as an entrenching tool. At my suggestion the battalion was formed and marched to the target range where the officers were assembled and instructed briefly in its use as herein laid down. They in turn assembled the chiefs of squads, and the latter imparted the instruction to the other men. The entire battalion was then deployed as skirmishers at 1½ yards interval. At the bugle signal to lie down the digging began, and at the signal rise up, given after a lapse of five minutes, it was discontinued and the pits inspected. They were dug by the men in a recumbent position and were generally satisfactory.

It would, no doubt, give to the knife a much greater value in the estimation of both officers and enlisted men of infantry were its use as an entrenching tool in connection with the individual rifle pit more generally understood. At present the knife is regarded by many as a useless incumbrance. Whether it is what it should be, and whether the form of rifle pit proposed is best for the purpose, are questions which I do not propose to discuss further than to suggest that in view of the great range of the modern rifle and the paramount importance of cover, they are of practical interest and therefore worthy of attention.

Fig. 6.

METHODS OF INSTRUCTION IN FIRST AID.*

By Captain JAMES E. PILCHER, Assistant Surgeon, U. S. Army.

AN ancient writer, named Agatharchides, in describing the prehistoric race of Troglodytes, dwelt upon their method of displaying fondness for the sick and infirm by affectionately drawing a cord about their necks until they suffered no more—the fact that the sick might object to such drastic measures, or that the patient's life was ended as well as his illness, appeared to cut no figure with the Troglodytes. They were not unlike the gentle Scythians, who were wont to employ a sort of Fabian policy in therapeutics, relieving their dear ones of the ills that beset them by tenderly depriving them of food until Death should arrive and complete their cure, which he invariably did in the most effectual manner.

Human altruism has, however, usually manifested itself ina different way. When, in the early history of our race, the sick received any attention, it was directed in the main toward the prolongation of life as well as toward the alleviation of illness. Efforts looking to the accomplishment of either were not a feature of early days. In case of war, no provisions were made by leaders for the relief of the injured in the field or on the march. The wounded soldier was dependent for help either upon the kind offices of his friends or the tender mercies of his enemies, and in the great majority of cases he was neglected by both, only to expire in lingering agony that was incomparably greater in its suffering than sudden death amid the fury of battle. Death being almost inevitable to the injured man, it is hardly surprising that the wounded warrior of old should have fought desperately until a fatal stroke put an end at once to present pain and future agony.

Wise in their day and generation were those communal soldiers of the Middle Ages, who took their wives with them into the field, in order that they might be assured of suitable nursing in case of a wound. Indeed, the vast companies of camp-follow-

* Read before the Association of Military Surgeons of the United States at Philadelphia, May 14, 1896.

ers that were found in the wake of every great army of that and later periods, were composed to no small extent of women, from whose numbers nurses were often secured for a favored invalid. But of organized and systematic assistance to the disabled there was none. The first field hospital in history was not established until the close of the fifteenth century, when Queen Isabella, of Columbian memory, established one at Antiquera. And even this was but a sporadic case, which was hardly duplicated for a couple of centuries, until Larrey and Percy became the fathers of the military sanitary system which has attained so great a development at the present day. During that period, however, surgeons progressed from the position of personal attendants upon great commanders to a recognized official station, with duties toward soldiers as well as officers. Finally, the trained sanitary soldier was conceived and created. The instruction of a certain number of the soldiers of the line in the treatment of emergencies and the preparation of cases for the trained sanitary soldiers became a fixed fact, and now the magnificent conception of instructing the entire enlisted force in the elements of first aid has been evolved and put in operation.

The methods of rendering relief were even cruder than the plan of organization. The few surgeons who accompanied armies in the retinue of royalty and nobility were themselves in the majority of instances mere ignorant pretenders, able to give only the most unintelligent and blundering kind of assistance. When the presence of surgeons in military commands became more general and of better quality, their help was still inefficient and incompetent, and this condition persisted almost up to the present day. The brancardiers of Percy were litter bearers, not emergency men. The care of the wounded even in hospitals was of a most defective character as recently as in our War of the Rebellion, and the battle field assistance was confined to the medical officers, aided by the "horse sense" of the wounded man's comrades. The thousands of deaths that occurred from a lack of an acquaintance with the methods of applying temporary aid, and the thousands more that ensued from sheer neglect, owing to the lack of sufficient attendants and of proper organization among the few who were present, can never be sufficiently regretted. In more recent wars progress has been made; but, as a matter of fact, no military medical organization has yet been able unassisted to grapple with the huge masses of sick and wounded incidental

to a great campaign. Solferino, with its five leagues of battle-ground thickly strewn with wounded in every stage of agony and lingering despair, incited the different nations to establish Red Cross societies. Yet, in the Franco-German War, when these societies put forth all their strength and struggled with unexampled energy, the wounded remained at Sulz on the battle-field absolutely deserted and additionally tortured by cold and hunger for three days; and at Gravelotte, where the ambulances could not arrive in time, the greatest suffering resulted among the wounded. At the beginning of the Russo-Turkish War, the Russian official medical service compelled the admiration of connoisseurs, who asserted that nothing was left for others to do; yet, during the progress of the campaign, the efforts of the official medical service, the exertions of the Red Cross societies, and the benevolence of private individuals were all strained and taxed to the utmost in the endeavor to succor the prodigious masses of sick and wounded troops.*

The work of the sanitary corps of the Japanese army in the recent Chino-Japanese War was effective in the extreme. An observer remarked: "While the storm of lead was still hurtling thickly through the air, a company of Red Cross men, always well to the front, appeared on the field, stolidly marching out from the ravines, two and two, with stretchers and first-aid appliances for their comrades, right under the withering fire from the gunboats, with never a moment's hesitation. Unarmed but for a paltry dirk at the side, helpless in any case against attack, with foes heedless or ignorant of the sacred significance of the Red Cross badge, they did not flinch for a moment on their errand of mercy. It would have been easy to wait until the fire should cease, but they nobly went on and did their duty as if on the parade ground at home. One by one, the dead and wounded were sought out all over that wide field of blood and borne away, until within twenty minutes the place was cleared of every man, living or dead." It was a most splendid example on a small scale of what first-aid organization and instruction can accomplish.

When a nation so new in Western civilization as the Japanese can produce results which command the admiration of the world to such an extent as in this instance, who can deny the *raison d'être* of instruction in first aid? The duty of rendering first aid to the injured after an engagement is characterized by Longmore

* Roberts' "Ambulance Work."

as a "vast and serious concern, not merely important in respect to preventing aggravation of existing suffering, but upon it depends the question of life itself in numerous instances, and in many others the whole future condition of the wounded, whether it shall be one of continuous pain and of comparative uselessness, or the reverse of these conditions." With so much dependent upon a proper knowledge of the subject, the question of the best methods of popularizing such knowledge is of the gravest importance.

By common consent, the meaning of the expression "first aid" has been restricted to the temporary assistance to be rendered by persons without medical training in the interval between the accident or emergency and the arrival of a medical man. Emergency surgery and emergency medicine are subjects excellently taught in many medical colleges to embryo practitioners of medicine, but first aid is far from being taught in the same proportion to the general public. During the last score of years, however, much progress in this direction has been made, largely through the influence of the St. John Ambulance Association of England. Thousands of civilian practitioners throughout the United Kingdom, Australia, Canada, China, Germany, Gibraltar, the East and West Indies, Malta, New Zealand, Russia, South Africa, and our own country, in addition to military surgeons, have undertaken the instruction of classes in first aid. The extensive amount of experience thus accumulated, supplementary to the military observations of many countries, is now available for examination and sifting in order to evolve the best method of teaching.

It was but natural that the oral method should have been the first to be adopted in teaching first aid. It was simply a recurrence to first principles. It was the way Adam taught Cain the gentle avocation of butchery and Abel the homely craft of horticulture. It was a most effectual method where the instructor was possessed of the art of putting things and the audience endowed with the faculty of rapid perception. But in these days we have not the phenomenal memories of other days, when all teaching was oral. Aids to the recollection are necessary not only on account of degeneracy of memory, but because the enormously increased extent of the field of knowledge has rendered it impossible for one mind to retain it all in detail. Niccolo Bertruccio, the greatest anatomical teacher of his epoch, taught the whole sub-

ject of anatomy in the eleventh century at Bologna in four lectures. But who would be so preposterous as to attempt to teach the subject as it is now known in a dozen times that number?

No description can take the place of a picture. The earliest form of writing was picture writing. The picture writing of the American Indian to-day is graphic and expressive in the extreme. Never was man such a master of word-painting that he could equal the sun for accuracy and suggestiveness. The pencil, the brush, and the camera are of the greatest value in making clear instruction in first aid. The thirteen cartoons of Henri de Mondeville, upon which the entire instruction in anatomy at the Paris School of Medicine in the thirteenth century was based, are famous in medical history. The anatomical drawings of Bartolommeo Eustachio were so vivid and accurate, that when they were discovered a century and a half after his death and published for the first time, they rescued his name from oblivion and emblazoned it high on the tablets of immortality. The interest displayed by a class in anything like a picture is evidence enough of the value of this element of instruction in first aid.

Early in the history of such instruction, the value of practical demonstrations was recognized, but these varied greatly according to the taste and wit of the lecturer. It is difficult for many a man to place himself in the position of treating an actually injured man in the absence of an actual patient; it is sometimes equally difficult to find a person who is willing to assume the rôle of an injured man, while it is rarer still that one can be found with the ability to assume the rôle in a realistic manner. There can be no question, however, as to the value of the practical demonstration; for, if conscientiously carried out, it will not only clarify the whole proceeding in the mind of the learner, but many points will be brought out unconsciously by the demonstrator. The training of the surgeon makes many things second nature to him which are absolutely beyond the ken of the non-medical man. These little essential features of treatment come to light in the practical demonstration. The demonstration also serves to correct in the mind of the learner misapprehensions into which he may have been led by ambiguities or technicalities in the words of a speaker. However careful a medical man may be in his effort to bring his language down to the comprehension of the uninitiated, some technicality, some scientific expression, precision itself to the physician but conveying no idea whatever to

the layman, is more than liable to creep in and obscure the sense of his explanation. This the demonstration will entirely correct.

And then, as with the invention of printing the old medical teachers put their prelections into type in order that their students might have copies constantly at hand as aids to memory, so the earlier first-aid instructors came to put their lectures into book form for the benefit of their classes. The "Erste Hülfe" and the "Samariterbriefe" of von Esmarch, the "Ambulance Work" of Roberts, the "Ambulance Lectures" of Martin, the "Emergency Notes" of Butler, and many others, were of this class, and are very attractive reading because of the colloquial style in which they were expressed. The little first-aid handbook of the late Surgeon-Major Shepherd, of the British army, was brought out by the St. John Ambulance Association, and a host of imitators sprang up all over the world. There was a demand, however, for more thorough systematically arranged text-books upon the subject, which has been met by the publication of a number of more extensive books, which are now the recognized authorities upon the subject in this country. The crop of the smaller and more defective little manuals continues to be active, every year producing one or two. There is no especial use for them; they are rarely in any way an improvement upon the original compend of Shepherd. Their only advantage seems to be that they excite an interest in first aid among the author's friends and adherents and certainly in the author himself, thus proving to be valuable agents in the propagandism of the subject. Whether this is counterbalanced by the fact that many of their readers are likely to look upon the compend as the sum total of the subject and to look no further, is a question. If, as is the case with the first-aid instructor in a metropolitan branch of the Red Cross Society, the teacher calls attention to the incomplete character of his own book and recommends the study of a more extensive one in addition, the only objection is wiped out. The proper use of the abbreviated manual is as a pocket book for constant carriage in the pocket as a remembrancer of the facts which have been learned by the study of a larger one. The use of two books in this way is certainly an excellent practice, as will be seen in detail farther on.

The use of the text-book is best completed by the addition of recitations. A cultivated and experienced student may, perhaps,

be able to absorb the contents of a book by simple perusal, but the ordinary reader cannot. Few persons have gotten beyond the stage of mental culture in which the verbal discussion of a subject which has been read is of the greatest service in fixing the facts in the mind. This is nothing more nor less than a recitation. Class recitation is preferable to solitary recitation, not only because of the advantages always to be derived from personal attrition with individuals engaged in the same pursuit, but because of the new ideas brought out in the class-room consideration of a subject. In numbers of instances in the writer's observation, suggestions of the utmost interest and advantage have been derived from the least promising members of his class during such discussions. The recitation plan is far superior to the lecture system because of the opportunity which it gives to the learner to formulate and fix the facts which he has been taught. For the same reason, it is even more to the advantage of the members of a first-aid class if they are given an opportunity to teach the subject to others. If a man possesses much personal pride, the position will put him on his mettle to learn more than his class, and prove a genuine stimulant to study.

All of these methods of instruction have their advantages and all of them have their failings. A plan, to be thoroughly successful, should combine all their good features and exclude all their objectionable points. And yet it is impracticable to devise a plan that shall be equally adapted to every grade of intelligence. There must be at least two grades of instruction, and perhaps three. In the army we have four classes of persons to instruct: 1, officers of the line; 2, hospital corps; 3, company bearers; 4, all other enlisted men.

The instruction of the officers demands particular care because they are learning the subject not only for their own information but for the purpose of in turn instructing the enlisted soldiers under their command. With the education and intelligence of this class, it will be practicable to proceed much more rapidly than with the others. It will usually be unnecessary with this class to pursue the recitation plan strictly, although the reading of a text book in connection with the instruction given by the medical officer is believed to be essential; nevertheless very great advantage will be derived from frequent discussions of the subject in a conversational way between the instructor and

the class, and, when properly carried out, such *conversaziones* are ample substitutes for the recitations, considered essential for the second and third classes.

The facilities for the instruction of the hospital corps are greater than for either of the other classes, their residence in the hospital and their more or less constant contact with the sick and injured giving them a certain degree of technique to be gained in no other way, while their freedom from other duties makes it possible for them to give much more time to first-aid study than any other of the four classes.

The company bearer, according to the experience of some medical officers, has been a most unsatisfactory subject for instruction, for three reasons: (1) The fact that through carelessness in selection a poor class of men is apt to be detailed; (2) the frequent changes in detail; and (3) the interference of other duties with the hours of instruction. These faults are all usually easily remedied—the first by calling the attention of the company commanders privately to the desirability of detailing good men; I have yet to find the company commander who is not amenable to reason under these circumstances. The second difficulty is also very readily overcome by calling the attention of the post and company commanders to the disadvantage of changes, and by declining to approve of new details. And as to the third objection, post commanders will almost invariably arrange for men on other duties to be present at the hour of first-aid instruction. I believe the company bearer to be an important factor in the first-aid work of the army, and it is hoped that he will remain as a permanent feature. The recent order requiring all enlisted men to be instructed in first aid has had a decidedly stimulating effect upon the company bearers. Realizing that they have the advantage of their comrades in their previous instruction, they are the more willing to push on and keep ahead.

The methods of instruction for the four classes may with advantage be very much the same, differing only in degree. The officers may be taught satisfactorily in weekly meetings and with the special modifications already suggested. The hospital corps, by daily instruction until qualification is attained, should be pushed forward to an entire acquaintance with the subject. The four hours a month allowed by Regulations for company bearer drill will, if economically occupied, be ample time for their instruction.

The method of instruction giving the best results is a combination of the *viva voce*, the text-book, and the practical demonstration. The subject of each lesson should be gone over orally by the teacher before any recitation is held upon it. The talk upon the subject should be illustrative and demonstrative, and points should be clearly brought out. The lecture, if it may be dignified with that title, should exactly cover the ground of the lesson assigned in the text-book for the next session. To obtain the best results, it will not be sufficient for the teacher simply to read the account of the subject from the book, as is not infrequently done; he must speak in his own language and endeavor to infuse the magnetism of his own personality into his class. Many of the learners will prefer to read the text-book version before the lecture, thus placing themselves in a position to more fully appreciate the comments of the instructor. The next hour of instruction should then be opened with a recitation upon the lesson previously given out. This recitation should not be conducted in a pedagogical style, but with a view not only to ascertain the familiarity of the student with the lesson, but to fix it in the minds of the learners by every available accessory. Charts, drawings, photographs, specially constructed apparatus, and practical demonstrations should all be used whenever they can be applied. The stereopticon is a valuable assistant, but there is a temptation in its use to overdo the matter; it should not be used more than once in four or five hours of instruction.

The great tendency of the instructor in first aid is to fire over the heads of his audience. "There is a fatal facility in the use of technical terms," says Butler, which it is difficult to repress. To present his facts in simple language and to avoid technicalities is the earliest lesson the first-aid instructor has to learn. It is astonishing what ignorance of matters pertaining to the human body and the ills to which it is subject may be found in the most intelligent laymen. It was only the other day that I overheard a discussion upon the reliability of the Scriptures, the argument being finally closed by a man of the highest intelligence, an author and of commanding influence in the community, who triumphantly cried: "How is it, then, that a man has one rib less on one side than on the other?" No technical expression should ever be used until it has been fully and distinctly explained; and, in general, simple Anglo-Saxon nomenclature is better than the Latinized verbosity of the scientific treatise.

"Bleeding" is better than "hæmorrhage"; a bone had better be "broken" than "fractured"; "breathing" is as good as "respiration"; "bloodless" is clearer than "exsanguinated." Simplicity of diction cannot be sought for too assiduously.

It goes without saying that the elements of anatomy and physiology are an indispensable preliminary to first-aid work. The amount of instruction in this introduction to the subject will vary with the four classes to be instructed. The hospital corps, officers, and company bearers should learn the skeleton to the extent of becoming acquainted with the names, shapes, and locations of all the principal bones and such conspicuous features of them as may be useful in first aid. It will not be necessary for them to learn the structure of the temporal or ethmoid bones, nor to know the tarsus or carpus in detail. But the peculiar arrangement of the bones at the elbow or shoulder or hip should be learned—they should know what the olecranon, the trochanters, and the acromion are, because of their relation to many accidents; and a similar acquaintance with other parts of the osseous structure is essential for a satisfactory comprehension of the emergencies connected with them.

The study of muscles and joints in detail is not needed in a student of first aid. The emergency man will not attempt to reduce any but the simplest dislocations, and individual muscles will play but a very unimportant rôle in any assistance he may be called upon to render. He should, however, know the general characteristics, purposes, and functions of them both. The nervous system is of comparatively little importance to the first-aid man, and he need study only the first principles of its structure and distribution. He must, however, know the topography of the trunk with reference to the principal viscera, because of the important bearing these facts have on the application of first-aid treatment.

The vascular system is, of course, by far the most important division of the body with respect to first aid study, since treatment of its lesions forms the most important part of emergency work. The physiology of the circulation explains the philosophy of hæmostasis, and the topography, particularly of the arteries, is an essential for the application of proper treatment for hæmorrhage. The names of the principal arterial vessels should be learned and their location and some facts with regard to their size and and relation to dangerous bleeding. I shall not attempt, however, to

give a complete synopsis here of the anatomical and physiological facts essential as an introduction to first-aid study. I have done this in full elsewhere.* It is desired to suggest simply the merest outline preliminary to a brief consideration of the best method of teaching the facts.

The bony framework itself is the foundation of all first-aid study, and nothing can be substituted for the human skeleton for this purpose. The best results are to be obtained from a combination of an articulated and a disarticulated skeleton. In the former the mutual relations of the component parts can be shown and demonstrated, while by means of the latter the peculiarities of the individual bones can be shown. The course of the circulation and the location of its component parts, other than the heart, can best be shown by charts, as, except in the rarest cases, it will be impracticable to demonstrate them upon the cadaver, which is the ideal method. Moreover, except with the hospital corps, who become accustomed to death through their ordinary duties, there are peremptory though sentimental objections to the use of any part of the cadaver, except the skeleton. But, while the topography must be obtained from charts, many of the most interesting general facts and much of the morphology can be displayed in the anatomy of the lower animals. The common domestic cat † is a treasure-house of information for the first-aid class. A dog may be even better, if he is larger. It is well to anæsthetize the animal in the presence of the class and to demonstrate the action of the heart and lungs in active movement before life is extinct. If care has been taken that the act of digestion shall be active at the time of the demonstration, a display of the mesenteric lacteals is always received with great enthusiasm by a class. A few remarks upon the similarity and the differences in structure between the cat and the human being are always interesting and clarifying in their effect upon a class. The differences between the various kinds of hæmorrhage can be shown by practical illustration, and by opening a vein and an artery at the same time the venous and the arterial bleeding can be actually compared. A muscle or two can be dissected out to show what muscle actually

* "First Aid in Illness and Injury," by James E. Pilcher. 8vo. Second edition, 1894, pp. 322. Charles Scribner's Sons, New York.

† The subject may be studied up with advantage in Gorham and Tower's "Laboratory Guide for the Dissection of the Cat," published by Scribner; or the excellent work on "The Dissection of the Dog," published by Howell, Holt & Co.

is, together with its general morphology, and the tendons and aponeuroses can be displayed. If the long muscles be taken for demonstration, an excellent showing of muscular action can be given. The biceps, for example, may be isolated and the forearm moved by traction upon it, so as to show both flexion and supination. The sciatic nerve can be uncovered and used as an illustration of the elements of the nervous system. The skull can be opened and the undeveloped brain of the cat can be used to demonstrate the membranes and substance of the brain and its relation to the spinal cord. The brain itself can be made to give interest to the comparatively uninteresting topics of brain compression; for this purpose it is well to use two beef's brains, one hardened in alcohol to show the form of the brain and its parts; and the other fresh, to show the texture and friability of its substance—an important feature in the demonstration. A glance at ophthalmic anatomy upon a beef's eye may always be used with great advantage to lend interest to a lesson, while the study of the circulation can never be considered complete without a demonstration of the heart's action upon the cardiac organ of a bullock, using, to show the valvular action, either air through the blow-pipe or water through a rubber tube. The interested student of first aid should be advised always to read over in his manual on the subject the topic of the demonstration, both before and afterward, in order to prepare his mind to understand the demonstration and to impress upon his mind what he has been shown.

The elements of bandaging and surgical dressing should always be taught practically. For the ordinary first-aid class the triangular bandage will be ample, but the hospital corps must be taught the application of the roller bandage as well. It is my plan in teaching the triangular bandage, after carefully explaining the theory and practice of the dressing and showing its practical application upon all parts of the body, to divide the class into equal parts, calling them the front and rear ranks respectively. Each member of the class, then, at the word of command, applies each bandage upon the man with whom he is paired; first, each front-rank man applies the head bandage upon his rear-rank man, who then at the word of command reciprocates the act; the rear-rank man then applies the next bandage, and the front-rank man reciprocates—and so on alternately until the entire subject has been thoroughly gone over. This plan is

an excellent one to follow in studying the treatment of bleeding, of broken bones, and of wounds. It not only gives each member of the class actual experience in applying treatment, but enables him to see its application in his own person, fully as instructive an experience as the other. What medical man has not learned far more about some malady by observation in his own case than he could have been taught by a thousand lectures and a hundred cases in other individuals?

The treatment of drowning and the use of artificial respiration for suffocation and other purposes may with great advantage be taught in the same practical manner.

Exercises in the extemporization of dressings are of the greatest importance and contribute greatly to the interest of a class. Each member should be given the opportunity to exercise his own inventive faculty in the origination of such appliances. The amount of ingenuity developed by these practical exercises is sometimes remarkable in the extreme. The suggestions as to materials for dressings, splints, padding, bandages, and the like are often original and valuable enough to instruct the instructor.

Medical emergencies do not usually admit of practical demonstration. The "dummy chucker" does not, as a rule, practise his arts for the delectation of first-aid students, although it might be possible for an instructor whose work brought him in contact with the criminal elements in a large city to find one for the benefit of his class. I considered myself very fortunate when, upon one of my drill hours, a company bearer had an epileptic convulsion in the presence of the detachment. This has occurred but once in my experience, however, and I do not expect it again; and this class of emergencies, including the treatment of poisoning, particularly demands the use of a text-book. It is impossible for a lecturer, however graphic and impressive his delivery may be, to impress these subjects clearly, definitely, and sufficiently by verbal effort alone. They must be learned by careful study and repeated re-reading.

One of the most efficient elements of success in maintaining interest is variety. A pursual of the method already rehearsed would give variety to a lesson upon most of the emergencies considered. But a plan that is of advantage in all cases is to divide the time for instruction into three parts, devoting one part to a brief lecture and demonstration, a second to a quiz and recitation, and a third to litter drill. When either one of the three

seems to demand more than a third of the time, any one or any two of them may be dispensed with. Variety may also be obtained by detailing a member of the class to conduct any part of the work, giving him sufficient time previously to enable him to prepare himself for the duty.

The foregoing remarks apply more particularly to the instruction of the first three classes—the officers, the hospital corps, and the company bearers—given by medical officers. The instruction of the fourth class—the enlisted men in general—must necessarily be much less complete, for several reasons, not the least of which is the lack of capacity upon the part of the men who are to receive it. The amount of instruction actually given to the companies will necessarily vary according to the personality of the instructing officer. But enough for the purpose may be presented in five lectures upon the following subjects, each occupying a full hour:

1. The Human Body (the skeleton and the circulation in particular).
2. Bandages and Dressings (the triangular bandage in particular).
3. Wounds and Bleeding.
4. Broken Bones.
5. Insensibility (drowning in particular).

These subjects need not be presented in a consecutive series, but the lecture hour for several occasions succeeding each lecture could with much advantage be devoted to going over the matter of the lecture with the men and fixing the points in their minds. Wounds, for instance, should not be ventured upon until the bandages and dressings have been mastered.

The question of impressing the facts retentively upon the remembrance of the men is a most difficult problem. Demonstrations of practical anatomy are, of course, out of the question, and it is usually impracticable for the skeleton to be used in teaching the bones. Here pictures must come in. Charts may be issued to the companies for general demonstration. It is impracticable to expect them to study first aid from a comprehensive text-book, for many of them have not the intelligence to comprehend the subject upon reading, and a still greater number have not the patience to try it. In this case it seems to me that we should go back to the method of the untutored savage, which should be

within the comprehension of the least intelligent soldier, and teach by picture writing. Something of this kind has been attempted in the German triangular bandage of Esmarch, which has been almost ruined in the peculiarly wretched American imitation. The St. Andrew's Ambulance Association of Scotland produces a triangular bandage which is a great improvement upon all others, and in it has been attained the climax of pictorially treated bandages. But these are unsatisfactory as means of instruction, both because of paucity of information and their deficiency in permanence. It is impossible upon a triangular bandage to illustrate, even with very small representations, a tithe of the points needed to impress the mind of the soldier, and the crumpling and soiling of the bandage in the hands of its possessor will easily render it too illegible for consultation—an objection which will grow with the enthusiasm of the frequently perusing soldier.

Admitting the value of the handkerchief within its limitations, *i. e*, the illustration of only a few of the principal procedures in which it is applicable, we should go much further. The need can be supplied by a little book containing pictorial representations of all the important facts of first aid, with as little reading-matter as possible. After this idea had been quite fully developed in the writer's mind, his attention was called to the "Album für Krankenträger" of Dr. Ruhlemann, a surgeon in the army of Saxony, which had been used with very great success in the German army. Dr. Ruhlemann's book is directly in the line suggested, but with the pages a trifle too large and the illustrations very poorly executed. A little book upon this plan is now in active preparation for the American press, and in it an effort has been made to do away with the objectionable features of the German work, and to present a little manual clearly American in its characteristics as well as in its language, and arranged in the order suggested as the most desirable one for the instruction of the enlisted force.

Officers of the line may with much advantage, in transmitting first-aid instruction to their commands, utilize as far as practicable the features for interesting and stimulating the attention that have been presented by their own medical instructors, and add to them such other features as their own ingenuity and enthusiasm may suggest. Competition is always an important stimulus to work among men. The enthusiasm which is awakened by competitions of any kind, from base ball to rifle prac-

tice, may well give us pause in our consideration of methods of instruction in first aid. The writer saw a Canadian judge and an officer of one of the Massachusetts courts, on the high seas and near the coast of France, where it was impossible for either to learn anything of the merits of the case, warm up to the point of personal collision over the respective merits of *Valkyrie III.* and the *Defender*. The quality which will, at the close of the nineteenth century, bring to the point of the duello two gentlemen of the practical Anglo-Saxon race, because of the rivalry of a couple of racing sloops, would certainly seem to be an advantageous addition to first-aid instruction. Competition may be introduced into first-aid military work by the institution of inter-company, inter-regimental, inter-department or -brigade first-aid competitions, and the establishment of a grand periodical competition for the championship of the entire army. Each company being divided into little squads of four men, graded by a competitive examination, the winning squad should be entitled to compete for the championship of the post or regiment. The champions in this competition should then be assembled at some central point in the department, considering the army, or the brigade, considering the national guard, to compete for first place in the department or brigade. And, finally, at such intervals as may be desirable—annually, biennally, triennially, or even quadrennially—the department or brigade champions should be given an opportunity to compete at some central point for the championship of the army or State. A trophy, consisting, perhaps, of a bronze figure in armor protecting a wounded comrade with a shield bearing the red cross, might with advantage be the chief trophy, the custody of which would be awarded to the company furnishing the victorious squad. Similar smaller designs could be awarded to the companies furnishing the department or brigade champion, and still smaller ones for the champion squads of the regiment or post. The writer has often observed the advantage of competition in drilling his own detachment. When the day is depressing and the men seem a little sluggish, the dummy wounded are often instructed to seek their own location, and then, after informing the detachment that the design is to see which squad will bring in its man the most expeditiously, carefully, and safely, the command is given, "Search for wounded." At the first suggestion of an approaching competition an alert expression supplants the sluggish one,

the eyes brighten, and eagerness characterizes every attitude. The response to command is instant and their execution of the order characterized by a degree of efficiency obtainable in no other way. It is believed that the extension of the feature of competition to the entire army in the manner suggested will be of incalculable benefit in promoting the efficiency of the service.

First aid in illness and injury is an active, living issue of a concrete kind, that can be appreciated by every one, whether in the military service or in civil life. It is, then, of the highest importance to determine the methods of instruction from which the greatest efficiency of first-aid service can be derived. From our study, we have determined that in military practice there are two principal grades of instruction:

A. Instruction of the officers of the line, the hospital corps, and the company bearers, given by medical officers.

B. Instruction of the enlisted soldiers in general, given by officers of the line.

1. The best method of instruction is a combination of the lecture, the demonstration, and recitation from a text-book, neither of the three being sufficient without the accompaniment of the other two.

2. The best instruction is characterized by extreme simplicity of diction and the avoidance of all technicality in language.

3. The best instruction is progressive in character, beginning with anatomy and physiology, and advancing to bandages and dressings, and then to emergencies proper.

4. The class-room work of the first grade is advantageously supplemented by home study of a first-aid text-book, and, when desired, it may be complemented by the use of a pictorial remembrancer.

5. The class-room work of the second grade may best be confirmed and fixed by the use of a pictorial remembrancer, a copy of which should form a part of the equipment of every soldier.

6. Interest in the work of both grades should be stimulated in every possible way, especial attention being devoted to the development of interest in the second grade, a series of public competitions being suggested, the champions to be rewarded by the custody of suitable trophies.

By the methods and with the stimulus thus provided, it is

believed that every member of the military forces of the country, including the army, the militia, and the national guard, may become qualified to cope temporarily with any relievable injury that may occur on the march, in camp, or on the field of battle. War can never become benevolent, nor can bullets be transformed into white-winged messengers of peace; but the horrors of war can be enormously mitigated, the sufferings of unnumbered victims assuaged, thousands of useful lives saved. It has been stated that after an engagement more deaths occur from delay in applying proper treatment and from exposure on the field than from the fire of the enemy. It is the function of first-aid instruction to avert all these, and by the magnificent organization now established to diminish the mortality of future campaigns, to achieve victory at a smaller cost, and to dull the teeth of the dogs of war.

And in time of piping peace, no less than in days of raging war, will the good effects of the system be felt. The thousands of men that every year go out from the army and the national guard into the daily life of our country will carry with them the ability to succor the suffering and rescue the perishing, and, by the aid which they will afford here and there throughout the entire nation, will accomplish an amount of good, by the side of which even the splendid philanthropy of first aid upon the battlefield will seem to be insignificant in comparison.

PROXIMITY OF ENGLAND TO THE UNITED STATES CONSIDERED IN REFERENCE TO HOSTILITIES BETWEEN THE TWO NATIONS.

By Captain GILBERT P. COTTON, 1st U. S. Artillery.

IN the early years of the Republic, when we were a collection of seaboard States, the three thousand miles of Atlantic separating us from the old world gave a sense of isolation and security much of which has been lost during the last half century. The Atlantic has shrunk wonderfully in our time. A new world has been created by the revolutionizing factors of steam and electricity, and the great changes brought about by the discoveries of science have affected our position as a nation. The contraction of the globe has brought us into closer proximity to Europe, and especially to that vast network of colonies and dependencies which make the strength of our great rival, the British Empire.

We have become conscious of her presence surrounding us on all sides, with each extension of our territory. When we reached downward to the Gulf, we found her outposts studding the Caribbean Sea; and as the West was recovered, the Canadian frontier stretched with our own to the Pacific Ocean.

Let us first take the position of affairs on our northern frontier. The Canadian boundary line, except where it is formed by the Great Lakes and the St. Lawrence, is an arbitrary arrangement settled by various treaties between the United States and Great Britain. There are no natural barriers separating the Eastern States from Quebec and New Brunswick, and the line laid along the 49th parallel of latitude from Lake of the Woods to the Gulf of Georgia passed for many years through regions unexplored. The frontier, west of Lake Superior, has only acquired significance in the last few years. The Canadian Pacific has scattered a sparse population in the territories through which it passes, and has built up small towns here and there along its route. It is the Canadian Pacific which has created the frontier in so far as it affects the United States. This railway is a military road subsidized by the government for imperial purposes

exactly in the same way as the Trans-Siberian road is being built from St. Petersburg to Vladivostock to further the aims of Russia. It is essential that this should be borne in mind, as the successful completion of the line makes Canada the keystone of any system of imperial defense. It has also had the immediate effect of consolidating the Dominion. Before 1886, the year in which the first train ran from Montreal to Vancouver, British Columbia was almost entirely separated from the rest of the empire. It was only reached by the long voyage round Cape Horn, or by the Isthmus of Panama, or latterly by way of San Francisco. At the present time, the most remote regions of British North America are within twelve days of London. As an imperial highway, the importance of the Canadian Pacific is becoming yearly more apparent. It furnishes an alternative route to the Suez Canal in reaching India and Australia, and greatly decreases the distances between England and China and Japan. This is fully recognized by the home and Dominion governments, and large subsidies have been offered to found steamship lines to complete the system on the Atlantic and Pacific.

Already regular lines have been established between Vancouver and Yokohoma and Hongkong; and between Vancouver and Australia, touching at Honolulu and the Fiji Islands; and a sum of $1,250,000 annual subsidy has been voted for a line of powerful steamers, of the highest class, between Liverpool and Halifax. Let us briefly consider how the building up of this system will affect the United States. In the first place, to guard the termini of the line, fortifications have to be maintained on the Atlantic and Pacific coasts. We have Esquimault on the Pacific, greatly strengthened since the completion of the railroad, and which is a perpetual menace to the commerce and towns of Puget Sound; and on the Atlantic, Halifax with its splendid harbor, the strongly garrisoned station of the North Atlantic squadron. The geographical position of Canada adds to the significance of these two stations, as they occupy relatively the points nearest the opposite continents of Europe and Asia; and while Halifax commands the inexhaustible coal supplies of Nova Scotia and Cape Breton; on the Pacific, near the terminus, are excellent harbors protected by Esquimault, and there is an abundance of coal in the Island of Vancouver,—indeed the only coal of a good quality on the Pacific coast from Cape Horn to Puget Sound. San Francisco to-day draws its coal supplies

largely from Vancouver or from the British colony of New South Wales.

Halifax is only 2530 miles from Liverpool. The Atlantic line of steamships once in operation, troops could be landed there in five and a half days; at Quebec, 2661 miles, in about the same time; at Winnipeg, in eight and a half days; and at Vancouver, in ten or eleven. Four years ago the management of the Canadian Pacific made representations to the imperial government that it would undertake to transport men in blocks of 5000 from troopships in Halifax to Vancouver in seven days. Complements of ships' crews for service in the Pacific, amounting to six hundred men, have been transported in this time. Contrasted with the time occupied on either of the old routes, by Cape Horn or the Suez Canal, this is startling, and is suggestive of the lessened importance of distance as a factor in problems of defense. It is probable that troops could be spread along the whole line of frontier from Atlantic to Pacific in less time than it would have taken to send men from England to Halifax in the time of the Civil War. The availability of the road for transport of troops in the Dominion has already been tested. Before the line was laid, it took several months for the Canadian militia, aided by imperial troops under command of Lord Wolseley, to quell the first Riel rebellion ; the second outbreak in 1886 was suppressed in a few weeks by the militia alone.

It is usually asserted that, in event of hostilities, Canada would be unable to protect her vast line of frontier, and that the Canadian Pacific would be torn up in fifty places within a week. It might be urged that 4000 miles of frontier are as perplexing for attacks as for defense. Sir Charles Dilke points out that while the risk from organized attack must everywhere be great, the danger from mere raiders is not of so extreme a nature as is commonly supposed. There is no bridge or other structure between Montreal and the Columbus River, nearly 2500 miles, which in event of its destruction, could not be replaced by a temporary structure, over which troops might pass, within two days ; unless indeed the spot were held by a hostile army. From Columbia to the Fraser River bridge there are half a dozen structures which would require from five to ten days to replace, but they are on a section of line which lies far to the north, within the mountains, and are practically inaccessible to mere raiders. The line is more exposed to attack where it skirts the border of Lake Superior.

The destruction of the line at this point would depend on our gaining immediate control of the lakes. It is generally taken for granted that we could do this without difficulty, especially as our merchant marine on the lakes is overwhelmingly superior to that of Great Britain. At present, under treaty provisions, neither the United States nor Great Britain can keep more than one small naval vessel upon our northern lakes, but Canada could, at a moment's notice, furnish guns and mounts to her merchant vessels, and is prepared to do so ; whereas, on our side there is no reserve of ordnance or ordnance stores. I may here draw attention to the fact that there is a scheme at present under consideration of the Canadian government which would minimize the importance of a seizure of the Canadian Pacific at this point. It is proposed to build a northern railroad connecting Winnipeg and Lake Superior with Fort Churchill on the west coast of Hudson's Bay. In the event of a summer campaign, by this route, troops would be brought from Liverpool to Lake Superior within six days. It may also be noted that even if by force of arms we were able to close the Welland Canal, it would be possible for Great Britain, if in possession of the railroads, to transport some of the smaller of her immense fleet of torpedo vessels from the Atlantic to the lakes.

I have dwelt at this length on the Canadian Pacific because its construction has been one of the great factors in the shrinkage of the globe which has taken place in our time, and which has materially affected our position as regards the old world, and also because, as I said before, it has made Canada the keystone of any system of imperial defense which may be necessitated by the federation of the empire. It may be objected that such federation is visionary and impossible of realization, but it undoubtedly holds a greater place in the minds of British statesmen at the present time than it ever has before. We have heard during the last few days one of the most influential ministers of the crown declare himself in favor of the formation of some kind of zollverein of the mother country and her colonies and dependencies. It is improbable that Great Britain will consent to any scheme of this nature, by which the colonies would benefit so greatly, without asking them to contribute towards the defense of their common interests. The movements of events seem to force this as a condition to the continued existence of the empire. Suppose federation to become a fact, we can at once see the immense importance of the imperial highway across Canada, enabling Great

Britain to call up reinforcements from Australia and the East. But even as it is, without any definite scheme in operation, the annihilation of space by steam and electricity has drawn the meshes of the great network of empire closely around us on every side. England is to-day vastly more powerful for offensive purposes than in any past time. The first condition necessary to make her immense sea-power effective against the United States, is a proper provision of fortified harbors, dry-docks and coaling-stations; and insistence on this fact has led to a systematic strengthening of all points of vantage around our coasts held by Great Britain. We find coaling-stations established at St. John's, Newfoundland; at Halifax; at Bermuda, Nassau, Kingston, Barbadoes, Trinidad and Georgetown; and St. Lucia strongly fortified as a coaling-depot, and to protect the harbor of Castries as a rendezvous for the fleet. On the Pacific coast, there are coaling-stations at Victoria and Esquimault, and a graving dock at Esquimault. Even the Falkland Islands, down far in the southern hemisphere, have been fortified as a coaling-station, to guard the passage round Cape Horn. There are also docks at Halifax, St. John's, Bermuda, Barbadoes and Georgetown. All these points on the Atlantic and Gulf coasts are within a few hours steaming distance of any of our seaboard towns, and yet there has been little attempt made to fortify our harbors or increase facilities for the docking and repairing of our ships in time of action. And how much more important will this chain of fortified islands become if the United States undertakes the building of an isthmian canal.

Now let us glance at another important factor having a direct bearing on this question of proximity. We have rapidly glanced at the tremendous change effected by the use of steam and the increase of speed attained during the latter half of the century. But another agent, and that of America's creation, has also tended to bind the world more closely together. The submarine cable will surely play an important part in any future war; and here the great strength of Great Britain is again shown. One of the leading French journals has lately published a series of papers calling attention to the fact that nearly all the submarine telegraph systems of the world have been built by British capital, and are managed by the English for the benefit of the empire, and urges strongly the dangers and disadvantages of such exclusive control to other nations in time of war or peace. We have

recently had an instance of the way in which the British government can use the cable system in times of emergency. During the South African crisis the foreign office had entire control of all telegraphic communication with the Transvaal, and issued or withheld information as it served their purpose. The twelve cables connecting this continent with Europe all have their termini in British territory, first touching land either in Newfoundland or Nova Scotia. The French cable landing at St. Pierre would, in time of war, be practically within the boundary line. A cable constructed for purely military purposes connects Halifax with Bermuda, and it is proposed to continue this, under a subsidy from the imperial government, to Jamaica. There is already a perfect system of cable communication between the West India Islands and connecting them with the South American continent at Georgetown, Demerara. When the Halifax-Jamaica cable is laid, all the crown colonies of the Caribbean Sea will be linked with the Dominion and brought into direct touch with the mother country. Another subsidy is to be granted for the construction of a cable across the Pacific—from Vancouver to Australia. These subsidized cables in the Atlantic and the Pacific will complete a system circling the globe, and establish perfect intercommunication between all points of the empire. The many uses of the cable in warfare in directing operations of the fleet and in sending news of the enemy's movements from point to point are apparent, and it also provides the means of warning ships liable to seizure, so that they can enter neutral ports and wait until the danger is past. In this way the cable may help to lessen much of the injury we might otherwise be able to inflict on British commerce. Very few German ships were taken in 1870-71, although the French navy had full command of the seas. We can imagine how this system of submarine communication would have added to our difficulties with blockade runners and Confederate cruisers, if it had been perfected at the time of the Civil War.

In estimating the influences at work to consolidate the empire and to closely unite with her dependencies on this side, the enormous increase of British shipping during the last thirty years must be taken into account. Not only the increase of tonnage, but the increase of speed and the establishment of regular steamship lines to ports on this side of the Atlantic, has helped to bring England closer to our shores. In 1860 the average length

of passage from Liverpool to New York was ten days; to-day it is under seven. The tonnage of the largest vessels crossing the Atlantic at that time did not exceed 5000 tons, which has been more than doubled in the latest addition to the mail lines. It must be sorrowfully remembered that while in 1860 American and British shipping stood almost equal, British shipping in 1896 is considerably larger than that of *all* the rest of the world put together. The regular lines with all their perfected machinery provide means of transport that can be utilized at a moment's notice. England is the only nation that has had much experience in transporting troops by water, and has greatly improved the organization of this branch of the service. The government relies now entirely on the private shipowners, and has no difficulty in securing suitable vessels, at the shortest notice, furnished for the conveyance of horse or foot or for service as hospital ships. In the Egyptian campaign of 1882, sixty-six steamships were used for the conveyance of troops and supplies from England to Alexandria, and hired transports brought the Indian contingent to Suez. All was done with the utmost dispatch and with complete success. The American naval officer attached to the expedition says in his official report: "The speed and ease with which large bodies of men can be conveyed in these days of steam, renders possible to a great maritime power like England the landing of an army from home in comparatively little time. The attack is vastly more independent now than formerly, and can select its point of debarkation without regard to contrary winds and perverse currents. These considerations entail the necessity of efficient defense, no matter how remote the coast may be from the powers that are to be dreaded, and are of especial value in connection with our own isolated but not unattackable position." He also adds this note, curiously illustrative of the contraction of our planet during the century. "The transports which brought the British troops from England to Egypt accomplished their journey, on the average, in a little more than one-third of the time consumed by Bonaparte's flotilla in 1798, in the passage from Toulon to Alexandria, over a distance less than half as great." Besides organizing her means of transport, Great Britain has also built up her naval reserve in ships and men. There are eleven merchant vessels of great tonnage and high speed subsidized as reserve merchant cruisers, and many others held at the disposition of the government. In fact it may be

said that nearly all vessels of a high rate of speed and of more than 6000 tons are built in accordance with the requirements of the Admiralty, and are convertible to cruisers on declaration of war.

So then it may be fairly considered, as Murat Halstead recently said, "that the United States and Great Britain are the two great powers on the American hemisphere, and there is no third." The United States has been growing in power, and the Americans and British have been rubbing against each other. The British have formed the habit of regarding us as not organized and equipped for war, on land or sea, and the people of the United States—those that are informed on the subject—have not felt pleased by the military establishments of the British that menace us in the Atlantic and Pacific. Those four great fortified harbors—Esquimault, Halifax, Bermuda, and St. Lucia—vast arsenals, with docks and coal, loom upon our vision like spectres! This is not a coincidence. It is an imperial policy. They must mean us, and us only, by those great forts, between which their fleets glide, according to the orders sent through military land wires and cables that already cement all parts of the empire, with the exception of a few small islands.

It is very certain that the United States has some momentous matters to discuss with Great Britain, involving the question of the primacy in the Americas.

Between the British possessions in North America and the States of our nation, there is the longest and most complex boundary between any two nations. There is nearly 4000 miles of it, touching and dividing inland seas and taking account of great rivers and ranges of mountains and vast plains. There is ample space for friction.

The daily news is now the common property of advanced nations. The British and ourselves are in constant communication and conversation; and speaking the same language, we know each other better and have more to do with each other than any other people have with either or with anybody else. The swiftness of trains and ships, the interchange of intelligence, the cheapness and rapidity of transportation, involve the nations by proximity and ought to produce a common stock of good will among people so near together. We could do our share to this end, and get along much more comfortably with the British, if they were not in their walk and conversation such superior

persons, and if they did not consider us so insufferably conceited.

We might as well realize now, as at any time, that these are troublesome conditions and that war is not impossible. Think of the havoc of such an event! A war between Great Britain and the United States now would inflict as great a damage upon mankind as a war that would involve all the great European powers.

The same situations and influences and appliances, railroads, steamers, telegraphs, newspapers, markets, commercial intercourse, that cause the intimacy of people with people, awfully augment the waste of wars—their costliness in money and blood, through the more rapid destructive processes.

The very facilities of the highest civilization quicken the transition from a state of peace to one of war; hurry the shifting of the scenery; hasten the catastrophe and the conclusion! Then, too, war between us will come with a suddenness that will be startling. How lightning-like were the changes brought about recently in this country by the Venezuela excitement! Who can forget how nervously the destination of the flying squadron that England mobilized so suddenly was discussed.

The wars of the future will come and go in the same way. The blows that nations strike will often be bolts from the blue. It is said Napoleon sometimes marched his armies so that they carried the news of his declaration of war with them. So it will be with great captains again; only, wars ordered by wire will move on steel rails, and great fleets announce themselves.

Imagine England with a Napoleonic master and that he receive or construes an act of our Congress as equivalent to a declaration of war, and concludes to strike the unprepared people a stunning blow by way of answer, and that he has ordered the Channel Fleet and Reserve Squadron and all the vessels of war in American waters to Halifax and Bermuda, and sent forth a swarm of torpedo boats and gunboats to appear in Lake Ontario, Long Island Sound, and at Fort Monroe, simultaneously, with a declaration of war. The fleet at the Capes of the Virginia would, from Norfolk and Newport News, threaten Washington. The Channel Fleet in the Sound, or the old anchorage off Staten Island would hardly give us time to obstruct navigation. A few cruisers would stir up our coast and a dozen gunboats, passing through the Welland Canal, have the cities of Lake Erie under their

guns; and there would have to be sharp work to save the upper lakes from invasion, by obstructions at Detroit.

It is to be hoped that this will never transpire, and that the reassuring signs of peace so happily visible at the present moment may always be in evidence, and the surest way to secure this is, in my opinion, not to be lulled by any siren voice into indifference to our readiness, but that we should at once come to a realizing sense of the lack of correspondence between our warlike spirit and our lack of preparation for war.

SUPPLY OF AMMUNITION TO THE FIRING LINE.

By First-Lieut. G. B. DUNCAN, Adjutant 4th U. S. Infantry.

THIS paper has to deal with one of the unsolved problems of our military age, "The supply of ammunition to the firing line." It is considered unsolved in the light of the fact, that the crucial test of war has yet to be applied to the regulations governing the subject which have been adopted by European nations.

Our drill regulations is the result of study of officers of scholarly attainment, and of experience on the field of battle; the study not alone of the experience of this country, but of the experience of foreign countries, and of their very best military commanders, writers and critics. Our system is in effect the system of all nations of civilization modified to suit the different conditions of our organization and of the material with which it has to deal. The drill in close order provides the simplest possible method for the movements of troops, from a squad to a division, by which line of battle can be assumed in the quickest possible time. The drill in extended order provides for nearly every possible contingency of a continuous forward movement of attack. But I cannot find a word in orders or in regulations upon that subject of great importance, the supply of ammunition on the field of battle.

But of what avail is strategy, of the bravery of heroism, if at the critical moment troops have exhausted their ammunition? and unless the supply is kept up this is liable to occur. A good magazine rifle can be aimed and fired at the rate of about twenty shots a minute. Fire discipline will at long range prevent a use-

less expenditure, but as section and platoon and company advance, and the losses begin to get heavy, and leaders have fallen, economy of ammunition cannot be preserved. Courage will be kept up with rapidity of fire, and even increased by the desire of revenge for wounds received, or for friends fallen. These are the conditions which must obtain in the last 600 yards of an assault, beyond which point (600 yards) a renewal of ammunition over open ground will be impossible; and until that point is reached it will be necessary to supply with a fresh cartridge every one which has been expended.

The experience on the battle-field, of wars of the last thirty years, has shown a less average expenditure of ammunition than was anticipated, principally due to the battle being lost or won long before the different tactical phases of attack were carried out, and to many troops in reserve not getting into battle at all. Thus in the Prussian-Austrian war of 1866, it averaged only from 5 to 11 cartridges per man. The French army of Metz expended only 25 rounds per man, and in the same campaign the 12th German Army Corps expended in the various battles from 6 to 15 rounds per man. On the other hand at Plevna the Turkish battalions averaged over 150 rounds per man. And at St. Privât, German batteries were established on the height to the right, in the face of a brigade of French infantry who had exhausted their ammunition and were helpless to prevent the occupation.

The problem of ammunition supply to meet the demands of magazine rifles has in all European armies been worked out in the utmost detail and embodied in their regulations. The commander of a company knows in advance what will be furnished, and the proper action necessary to keep up the supply to his men. These systems are the result of the theories of the best soldiers of their armies, and of exhaustless tests and experiment made under conditions approximating as nearly as possible to the actualities of attack and defense in battle.

To evolve such systems has been a necessity, for these nations are but armed camps, waiting the signal to put in practice these preparations of peace. The fundamental idea is to place at the disposal of the infantry soldier such a number of cartridges as will allow full play to the capabilities of the weapon with which he is armed, as determined by the necessities of the fight.

The result of manœuvres in European armies to determine the number of cartridges expended by each soldier under condi-

tions simulated to that of war, has shown a tremendous increase since the introduction of the magazine rifle over the single shot breech-loader of ten years ago. Then an expenditure of 100 to 120 cartridges per man was obtained. But the practice of the last three years with magazine rifles, which in point of time lasted from three to four hours, during which expenditure of ammunition was carefully guarded, and firing conducted with great deliberation, the total expenditure of ammunition was doubled, and this might be exceeded in actual warfare. As far back as seventeen years ago the Ottoman army in the defense of Plevna, were provided with the then extraordinary supply of 570 rounds per man.

The fact then admitted of this great consumption of cartridges, the question arises, how must this supply be carried? The absolute number of cartridges to be carried by the soldier is limited, on account of the fatigue which the extra burden implies. And so in foreign armies the balance is carried in the company ammunition carts, and in the wagons of the infantry ammunition column, and the reserve ammunition in the parks of the army corps.

It may be interesting to know the number of cartridges carried daily by the infantry soldier of the different nations.

Germany 150. But it is believed, that, as a result of the experiments carried out at last year's manœuvres (94) that the number of cartridges carried by the soldier of this nation will be reduced to 120.

France and Denmark 120.

The United States, England, Canada, Japan, Austria, Spain and Sweden 100 per man.

Argentine, Chile, Peru, Norway, Switzerland and Turkey 150 per man.

Mexico and Italy 160. Belgium 180.

While the Roumanian soldier carries 200 cartridges.

I will give an outline of the system of supply of ammunition in France and Germany as presenting the best systems now in vogue.

The French soldier carries on his person 120 cartridges. In the company ammunition cart 65. In the wagons of the ammunition column 69. In the park of the corps 49. Total for each rifle 303 cartridges. This gives for the infantry fighting line 254 cartridges per man with 49 in reserve. On going into battle he

receives his 65 rounds additional from the company ammunition cart, which gives him a total of 185 rounds on his person. The cart then moves to the rear of the regimental reserve. During the battle the sections from the ammunition column, supply the troops directly by sending forward one ammunition wagon for each battalion. This wagon halts in rear of the battalion reserve, is emptied, and pauses in the fight are utilized for sending cartridges forward to the firing line, by men from the reserve. These ammunition carriers are supposed to return to the reserve. As far as practicable the ammunition of the dead and wounded is collected and distributed to the survivors. This must be attended to at once in any lull of the battle.

In Germany, each infantryman carries 150 cartridges and each trooper 50, besides a reserve of 50 cartridges per man contained in the two-horse company ammunition wagon. An army corps has at its disposition 4 infantry ammunition columns.

Each infantry ammunition column is composed of 23 six-horse caissons. The four columns belonging to a corps carry a reserve of 80 cartridges per rifle, for infantry, and 60 cartridges per carbine for cavalry.

For each army in the field there is created a field ammunition park, which consists of a depot and 10 movable columns divided into 5 groups. The army park carries 20 cartridges per rifle or carbine. The army park is supplied with fresh ammunition from the principal depot established in one of the fortified places of the frontier. The quantity of ammunition to be contained in such depot is not determined.

It will thus be seen that the German infantry soldier carries on his person in battle 200 cartridges against 185 on the French soldier. His supply for the fighting line is 280 as opposed to 254. His total supply, including what is carried in the parks, is 300, while in France, as we have seen, it is 303. Ten years ago the total supply for field of battle was in the French army 142.5 and in the German army 130. Less than half of the rounds of cartridges now carried as the fixed supply for the fighting line.

As regards the method of supplying ammunition to the firing line in the German army I will give the following extracts from the German *Felddienst Ordnung*, July 20, 1894:

"SUPPLY OF AMMUNITION. GENERAL.

"347.—Infantry which has exhausted its cartridges is deprived of its most powerful means of action.

"Therefore it is the duty of the first order for the commanders of every grade to make sure, either during or after action, of a supply of ammunition.

"All means without exception should be tried to carry ammunition to the troops in action and to keep up the fire, which, if it is sustained, may gain the day, and if it ceases, may cause it to be lost.

"348.—As soon as a serious engagement is foreseen, or as soon as it commences, the commanding officers of the principal units order up the ammunition and park sections and push some of them forward as far as the field of battle itself.

"In case of necessity, the necessary orders are to be called for from the commanders of the corps artillery.

"The troops in action are to be informed of the location of the ammunition sections which have been pushed to the front. The latter are obliged to deliver ammunition to any officer or non-commissioned officer who asks for it

"349.—As soon as troops are to move forward into action, the contents of the cartridge wagons are to be distributed among the men; the cartridges are stowed in the haversacks, and in the pockets of the coat and pantaloons. The cartridge wagons, after being replenished, are to take, under the direction of the mounted chief of the line of cartridge wagons, a sheltered position, as close as possible to their own units, and behind them; in urgent cases the wagons are pushed forward, irrespective of losses, to the very verge of the firing line.

"The chiefs of the line of cartridge wagons must deliver cartridges to any fraction of an organization that asks for them, without reference to the unit to which it belongs.

"350.—The men engaged on the firing line receive fresh supplies of ammunition, as far as possible, from the reinforcements which join them. If exceptionally, it is desired to send forward ammunition by a few men,* these men should be taken from the fractions in the rear that have not yet been engaged. Care should be taken to remove the ammunition from the bodies of the dead and wounded.

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* Each box contains five bundles; take the bundles two and two, slip the carrying loop of one through the loop of the other, and pass it over the end of a stick or sword-bayonet; the bundles may then be carried over the shoulder. Two men may thus carry the entire contents of a box, each of them carrying two bundles over the shoulder, and one of them having besides a bundle in his hand.

"The replenishment of ammunition should be accomplished as explained above, without special orders. The commanders as well as the men should themselves utilize to this end every opportunity that turns up, and do their utmost not only to provide the troops with the regulation number of cartridges, but also to have the greatest number possible on hand.

"351.—If the troops are to stand on the defensive, at least at the start, and especially if they are to occupy a position prepared at leisure, a supply of ammunition should be provided beforehand on the firing line (establishing ammunition boxes or other receptacles filled with cartridges, for example, along the line).

"352.—The duty of replacing the ammunition distributed by the cartridge wagons falls upon the battalion commander.

"On notice received from this officer, the commander of the unit engaged, if he has not already done so of his own accord, puts at his disposal caissons belonging to the ammunition sections, which exchange their filled chests for the empty chests of the regimental cartridge wagons, and thus replenish the latter immediately."

There is another factor which will probably enter in future wars, and which should be considered in making a plan for the supply of ammunition. I mean the use of machine guns on the line of battle, guns of infantry-rifle calibre using the service small-arms cartridge. They will consume enormous quantities of ammunition, as they can fire from 500 to 1500 shots per minute. These guns will be especially valuable in delivering long range fire. Their effective range being only limited by the ability of the gunner to see and observe. They can be fired with much accuracy at 4000 yards. Most military students claim that volley firing produces the greatest results, and no volley firing can compare with the fire possible from a machine gun.

What I say about machine guns is merely incidental, as introducing another weapon to be supplied with small-arms ammunition. A discussion of its advantages is foreign to this paper. Their use, however, will materially increase the provisions for the field of battle.

We come now to the question of the needs of our own service. Is there a necessity for regulations governing the supply of ammunition to the firing line?

Without specific utterance, but by the failure to provide reg-

ulations on the subject, the War Department answers the question in the negative. We are not in any sense a military power. Our entire regular establishment mobilized for war would be 12,000 men short of a single German army corps under the same conditions. The possibility of a war which would require the active operation of an army is most remote. Our neighbors in Canada are even on a more peaceful footing than we, while Mexico is about on a par with us.

It would seem a useless expenditure of labor and money, to provide an equipment of wagons for an infantry ammunition column and of a corps park. The necessity for company or battalion ammunition carts would be very rare, but like the hospital ambulance it might be well to have them around in case of an emergency.

While the necessity for our ever having a large army in the field is most remote, yet there are some modifications of our present method of handling and packing ammunition to be suggested, which would be an improvement in some respects upon our present system, and which would fit into the greater requirements of war.

To facilitate packing for transportation and for distribution to the men, and to preserve the ammunition, a small number of cartridges must be united in some form. A package of twenty rounds would seem to be the right number. The size and shape of the present Frankford package, taking everything into consideration, cannot be improved upon.

The Frankford package has the lid and body of the package separate but secured to each other with the string in place, by a stout paper band. The action of the string removes the lid entirely, and leaves the heads of the cartridges protruding sufficiently to be easily removed by hand. But each package should be marked by a colored letter on the outside showing its contents, whether carbine or rifle ammunition.

To increase the celerity, in distribution, it is proposed to unite every five packages by a twine string or band passed around them and tied with a knot and loop. This will make a large package of 100 rounds and weighing 6 lbs. 7 oz.

Every five of these large packages should be again united into a bundle and a strong cloth band passed around the middle of the bundle.

The bundle of 500 cartridges thus well secured should have a

cloth handle to carry by when necessary and for convenience in handling. Such a bundle would weigh 32 pounds 4 ounces. A man could carry it over any kind of ground and with ease and celerity, and his load would be 13 pounds less than that required in foreign service. These bundles could be easily opened with a bayonet and ammunition distributed by the 100 rounds or 20 rounds to the points most needed.

Two of these bundles could be put in the present Frankford packing box with a very slight change in dimensions of the box.

It is thought that the additional weight would not be a pound to the thousand rounds. A full box now weighs 75 pounds.

The present packing box is objectionable for field use, but good for transportation and storage. The objection is that it cannot be opened without tools.

A packing box intended to overcome this objection has been designed by Lieut. Colonel Williston, 3d Artillery. It can be opened easily and quickly without using tools, yet can be securely fastened to cover risks in transportation or storage; that is, it cannot be opened unintentionally, and if opened, the fact that it has been tampered with is apparent, for it has seals, the same protection as on the present box. An admirable method has also been suggested by Lieut. Penn, 2d Infantry (see MILITARY SERVICE JOURNAL, Nov., 1895). By either method ammunition could be easily and promptly issued to troops.

The remaining details to be worked out are those of a suitable ammunition wagon, which should be as light as practicable, and with as simple construction as possible, so that when damaged they can be repaired easily, and in the field if necessary.

With plan and specifications, prepared in advance, the leading wagon firms of our country could within a week have ready for delivery ammunition wagons enough to accompany an army corps. It might be well to have such details worked out in advance by a board of officers, and also determine the number of rounds, in excess of the 100 carried in the belt, to be carried in the battalion ammunition wagon, and in the ammunition supply train, so that in time of need there would be no unnecessary delay. To publish such data in advance to the army would be of benefit to all.

A uniform, efficient and simple method of supplying ammunition would make it much easier for a commander to control its expenditure and form a substantial basis for true fire discipline.

Many plans have been suggested. To my mind it is a matter of utmost importance for a soldier to carry on his person on going into battle as many cartridges as possible, for the best formed plan of a supply from the rear may fail. To this end, I would suggest that the men of each company be supplied with an extra circular Mills belt, to hold 100 rounds. These to be kept filled and carried in the company baggage wagon. For a company of 65 men the weight would be a little less than 500 pounds. On going into action these should be issued to the men and carried swung from the left shoulder and right side. This would give each soldier 200 rounds on his person, carried in the most secure and convenient manner possible.

A regimental ammunition wagon could carry an additional 100 rounds per man. The total weight of this ammunition would be 3750 pounds. This would give a regimental supply of 300 rounds per man immediately available. A still further supply should be carried in the division ammunition wagons, and in the corps park.

These suggestions are but the mere outline of a plan of supply, which if carried out in detail, it is believed would, in time of war, give simple practical results.

THE PRESENT CONGRESS AND THE NATIONAL GUARD.

By Colonel JAMES M. RICE, N. G., Illinois.

IT should be a source of great pleasure to every lover of our country's honor, peace and perpetuity to know that there is a very good bill now pending before the Senate of the United States "To promote the efficiency of the militia," with great probability of its passing.

This bill is certainly the best drawn of any that I have ever seen and I have been much interested in the subject for more than twenty years.

The effect of this bill, if we shall be so fortunate as to see it pass, will be to recognize, build up and promote the efficiency of the National Guard, and indirectly to promote the development of the other branches of our military service. I have always thought that every State should, and easily can, have a good National Guard, a strictly volunteer force; sworn to support the Constitution of the United States and of their own particular State, and to obey their Commander-in-chief and the officers who may be lawfully placed over them, without limitation as to the place of service; ready to march at the shortest possible notice; equipped and drilled; armed with the best modern military weapons and knowing fully how to use them, to hit what they shoot at under all conditions, and knowing they can hit, so they may have confidence in themselves and their weapons; with a permanent organization, so that experience obtained in any active service in war or otherwise may be preserved as traditions in time of peace. With a lofty *esprit du corps* thus engendered and preserved, these troops will be worthy of the confidence of their fellow citizens *as soldiers* and they can start into a campaign with the knowledge of how to use their arms and with much other of such useful knowledge of military matters as can be acquired in times of peace. Though generally they will be without much of the experience of the bivouac and battle, they will have at least as much, and probably more of it than most of the troops with which we must

begin our future wars, and they will stand prepared to commence as promptly and acquire that kind of experience as rapidly as any troops, and profit as much by it. They can claim already to have done a great deal to advance the military strength of the country. For a soldier to go into battle without a rifle would be very unwise. To go with one and not know how to hit what he shoots at is not much better. And yet in the matter of using their rifles to hit what they shoot at the National Guard and not the Army lead the way.

The Regular Army, the National Guard, the Navy, the volunteer army and the naval militia would all be very important to do the fighting in case of a war; and it would be very unwise, indeed, to rely alone upon any one or two of them. "To conduct a war," I suppose properly means to guide and control the campaigns, supply troops and in general to determine the policy to be pursued and to superintend its execution. The chief responsibility of this should certainly be upon the commanding general and the general staff of the army, upon what the Germans call the *General Stab*. We do not have exactly such a thing in our army. In fact we have no words that exactly correspond to their *General Stab*. The duties of such a body are enough, if properly discharged, to occupy the spare time of the brightest and best officers of the army, and it seems queer in view of what is being done abroad, that such a body is not organized and at work developing careful plans for the use of all of our forces in case of war.

NATIONAL GUARD MAY BE USED WHEREVER NEEDED.

The National Guard if rightly fostered and improved will be a very efficient and economical force to be used for almost any purpose and at any place where a force may be needed by either the state or the nation.

In a former paper I endeavored to show the reason why, and the manner in which, some error had found its way into the writings of some judges and lawyers, and to show that their premises being confessed by all to be incorrect, the result of their reasoning must be erroneous and endeavored to show the correct constitutional doctrine to be that there was no territorial restriction as to the use of the militia in the service of the United States. This paper was most severely criticised by Lieut. William E. Birkhimer of the Regular Army. He confessed, however, that as far as a proper construction of the Constitution was concerned, I was cor-

rect. This being the case, I do not care to discuss that question although he attempts to go back to it in his latter paper.

He then goes on to say:

"But upon this point, the essayist might well have saved himself the labor of his, it is believed, unanswerable argument. * * * Public opinion decided that question long ago in this country and adversely."

But after having said this he proceeded to enlarge at great length upon a very animated discussion that occurred in Congress in January, 1812, referring in particular to the speech of Langdon Cheves and that of Mr. Clay, whose unanswerable arguments in favor of the unrestricted use of the militia, he said were voted down without hesitancy. He made a great point of this discussion and this vote as settling the matter.

Now, when he discovers his error and finds that Langdon Cheves and Mr. Clay were not voted down but were overwhelmingly sustained, he says: "This bill, however, proposed to raise a corps of volunteers." Might I ask if it is any more a corps of volunteers or are they any less militia than they were when he referred to them the first time?

Those troops of Langdon Cheves whom the Lieutenant, having corrected himself as to the way the vote went, has suddenly discovered to be "Volunteers," were such, sure enough, volunteer militia, very similar to the present National Guard. Nevertheless, they were State troops and liable to militia duty in their States until such time as they might be called from their respective States into the service of the United States by the President.

This bill was introduced Dec. 26, 1811. Mr. Langdon Cheves made his speech upon it Jan. 11, 1812.

Mr. Clay's speech was made the same day.

The vote was taken on Mr. Key's resolution, Jan. 15, 1812, three days later. The bill was ordered to a third reading, Jan. 16, twenty days after it was introduced. It passed the House the next day, Jan. 17, and was approved and became a law, Feb. 6, 1812. There was no other military bill before the House during this time.

The last opposition to the bill was a motion by Mr. Nelson:

"That the bill, with its amendments, lie on the table for the present, to afford him an opportunity of bringing in a new bill to authorize the President to commission a corps of volunteers—say 30,000; 40,000, or 50,000; and, after a bill of this kind was

passed, he would join with the gentlemen in providing another corps for State purposes." (Annals of Congress, 1811 and 1812, Part 1, p. 799.)

Thus clearly intimating that this bill provided for State troops, and he wished to provide for National troops first and afterwards discuss the matter of State volunteers.

This bill was discussed during the whole time as if providing a volunteer corps of militia, and it was discussed with reference to the duties and liabilities of the militia under the Constitution, and the particular question on which Mr. Key's resolution was offered referred to the limitation or lack of limitation upon the power of the President to order the militia in the service of the United States beyond the frontier. Lieut. Birkhimer, himself, in his first article, said that Mr. Cheves, in discussing this bill delivered a speech in the House favoring the "unrestricted use of the militia (observe Lieut. Birkhimer does not himself say "of the volunteers") which for clearness of argument, closeness of reasoning and comprehensive grasp of the constitutional question involved, left nothing to be said on that side; and then Mr. Birkhimer goes on to say correctly, that he could not be answered, and incorrectly adds that he was voted down.

These proposed volunteers were very nearly such a corps as the National Guard.

The bill which Mr. Cheves and Mr. Clay advocated, and which became a law, provided that these troops should volunteer; the National Guard troops volunteer when they enlist. They paid their own expenses until called into the service of the United States and it was provided that after that while in the service of the United States they should receive the same pay and allowances as the army. It was provided that any company, battalion, regiment, brigade or division of militia already organized, volunteering, should be commanded by their own officers and vacancies should be filled by their own States according to their own State laws. They were to hold themselves ready to respond to a call at any time within two years and if called by the President were liable to serve twelve months from the time they were called into the service of the United States. The National Guard is bound to serve nine months, but three times as much can be done in nine months now as it was possible to do in twelve months at that time.

If this law had remained unchanged and in force, and action

had been taken under it, and if a large part of the troops organized under it could have been returned volunteer soldiers well schooled in war, as was the case with the National Guard, then the National Guard would have come into existence half a hundred years earlier than they did, and would have had the clear expression of the will and opinion of Congress that their service was and should remain unrestricted as to locality.

My critic also says that "Down to 1811 the militia of England could not be moved even to other parts of the United Kingdom." Why say down to 1811? The facts are that originally the militia of England were legally and actually employed wherever England wanted troops. By statute from time to time this power was more or less limited.

The statute 16 Geo. III. (A. D. 1775) was in force during the time in which we were declaring, and passing through the great struggle to secure, our independence. It provides: "It shall be lawful for his Majesty, his heirs or successors, to order and direct all the battalions of militia of their respective counties, or places in this kingdom, or so many of them as his Majesty, his heirs and successors shall judge necessary, to be drawn out, embodied, led and employed, in any parts of this kingdom," etc., etc.

This act expired by its own limitation in seven years.

The 26 Geo. III., cap. 107, "An Act for amending, and reducing into one Act of Parliament, the laws relating to the militia in that part of Great Britain called England," sec. xcvi, is as follows: "Provided always, and be it further enacted, that neither the whole nor any part of the militia directed by this act to be raised or maintained, shall on any account be carried or ordered out of Great Britain."

I do not understand how this can be construed to limit the service of the English militia to "that part of Great Britain called England."

This act was passed in 1786, and was I believe in force when the Constitution of the United States was drafted and adopted.

The peculiar institution and condition of affairs which originally made a statutory limitation of the place of service of the militia necessary in England do not, as it seems to me, exist here and none of such statutes are applicable to our institutions in the United States. Consequently they are not in force here. If any are in force here, how are we to determine which ones and how shall they be applied?

However, if any of them are applicable and law here, surely they have no more sacredness or permanency than an Act of Congress which any subsequent Act of Congress may repeal. If doubt now exists on this point it is certainly the imperative duty of Congress to immediately pass some law, which would forever settle and establish beyond all cavil, the right of the President to use the militia wherever he thinks they can do the most good. The bill now pending before the Senate provides for this and it is to be devoutly wished that the bill may soon become a law.

Lieut. Birkhimer refers to a statute of my State which adopts what he is pleased to call "the aspiring term 'National Guard' as providing that it (the National Guard) shall not be moved beyond the limits of the State without the consent of the Governor."

It would be much better, where the whole gist of a discussion depends upon the construction of a sentence, to quote the sentence correctly, or at least give its approximate meaning.

The statute reads: "No military company shall leave the State with arms and equipments without the consent of the Commander-in-chief."

"To be moved," is in the passive voice and is a somewhat technical phrase and imports that troops are being transferred from point to point by orders of some higher authority. For a company "to leave" imports their going of their own volition, quite a different thing.

This statute does not interfere with the power of the President under the laws and Constitution of the United States to call out and command the Illinois National Guard and "to move" them wherever he thinks necessary. No law of the State could do so and by this no such thing was intended.

"The Constitution and the laws of the United States which shall be made in pursuance thereof * * * shall be the supreme law of the land * * * anything in the Constitution or laws of any State to the contrary notwithstanding." (Art. VI., Sec. 3, Const. U. S.)

It is impossible to so draft a law that those who desire to do so can not criticise it. Laws can only be adapted to those who have common sense and are willing to use it. In this connection the Supreme Court of Illinois says:

"If we give to this section of the statute a common-sense construction and narrow its application to the militia when not in the

actual service of the United States, as must have been the intention of the Legislature as clearly appears from the whole spirit of the act we are relieved from all embarrassment as to its meaning. Assuming as a proposition too plain to admit of doubt, that this section of the statute applies only to the militia when not in the service of the United States, it may well be asked what right has a body of militia, organized into a military company, "with arms and equipments" furnished by the State, to go within another State, beyond the jurisdiction of this State, without the consent of the Commander-in-chief? The mere statement of the question is sufficient to suggest a negative answer. The presence of such armed forces in another State might tend to disturb our friendly relations with such State, and might be the cause of embarrassing complications." (Dunne *vs.* The People, 94, Ill., pp. 139-140.)

The Lieutenant says it does not remove the objection to relying upon the militia that some of them may be willing to cross the frontier and asks:

"When will it be ascertained that they are willing to go, and who is to select those who are willing from those who are unwilling to serve outside the territory of the United States and where is this selection to be made, at home or when the border is reached?"

That selection is made when a soldier enlists in the National Guard. By enlisting he promises and agrees and by his enlistment oath, in my State and I suppose in others, he also swears to support the Constitution and laws of the United States and of his own State and to obey the orders of his Commander-in-chief. His Governor is his Commander-in-chief when he is in the State service, and the President, according to the Constitution of the United States, which he has sworn to support, is his Commander-in-chief when he is in the service of the United States and there is no limitation made in the Constitution or laws of the United States or of the State or in the enlistment or elsewhere as to where he shall serve or what service he shall perform. He promises and agrees and is universally willing to do whatever a good soldier ought to do.

EXTRA TERRITORIAL SERVICE RENDERED BY MILITIA.

My critic is so pathetic in his appeal for just one case where the militia or State troops ever did service beyond the territorial limits of their government (not counting the one at Queenstown

which he has dwelt upon so persistently), I have concluded to mention just one. This I do more properly in this paper, for without the event referred to this paper would never have been written.

Patrick Henry, Governor of Virginia, being greatly annoyed by British and Indian raids, commissioned Colonel George Rogers Clark, and gave him open orders to raise what volunteer militia, Virginia State troops, he could, and go west for the defense of Kentucky. He had sealed orders, however, which were to cross the Ohio, wrest the northwest country from the British and relieve the Colonies from the bloody Indian raids from that quarter. He did it. On July 4, 1778, he took the provincial capital, Kaskaskia, with the British Governor of the territory, Governor Rocheblave, Fort George with its British regulars, cannon and all. Rocheblave, the governor, he sent home under Lieut.-Colonel John Montgomery, to his Commander-in-chief, Patrick Henry, at Williamsburg, Va. He finished his work the next winter by marching from Kaskaskia to Vincennes, his troops sometimes breaking through the ice too thin to bear them, often wading up to their armpits in water, with scanty food, but buoyed up by patriotic hopes. He thus captured Vincennes, now within the State of Indiana, and all of its British garrison, together with Lieut.-Governor Hamilton. He sent Lieut.-Governor Hamilton also to the Governor of Virginia to keep company with the British Governor Rocheblave, sent before. The Assembly of Virginia afterwards presented to General Clark an honorary sword, on the scabbard of which was inscribed "Sic semper tyrannis," and on the blade, "A tribute to courage and patriotism, presented by the State of Virginia to her beloved son, General George Rogers Clark, who, by the conquest of Illinois and Vincennes, extended her empire and aided in defense of her liberties." (History of Virginia, Campbell, p. 692.)

We owe several of the best States in the Union to General George Rogers Clark and his Virginia State troops and the service was rendered by them in what was then universally conceded to be in substance and in fact British territory and until then in the undisputed possession of our foes. My own city of Peoria, was originally called Fort Clark in his honor, but there were so many Forts Clark the name had to be changed to avoid confusion.

Dr. Lyman C. Draper says :—

"All that rich domain northwest of the Ohio, was secured to

the Republic at the peace of 1783 in consequence of his prowess." (Appleton's Cyclopedia of American Biography, Vol. 1, p. 627.)

This little army of General Clark did what volunteer troops are apt to do, increased its numbers by enlistment and remained in the service to the end of the war and they remained volunteer militia.

"This fourteen hours of fighting at Vincennes virtually terminated the war between the Colonies and Great Britain on the western frontier, and settled forever to whom the great territory bounded by the Allegheny Mountains on the east, the Mississippi on the west, the Great Lakes on the north and the Ohio on the south, should belong. It ended forever British dominion in the Mississippi Valley. The boundary lines agreed upon in the treaty of Paris after the Revolutionary War, were fixed on a basis of the position in which the close of the war found the opposing armies posted, and view it as we may, had Col. Clark's expedition into Illinois never taken place, the United States would to-day occupy the narrow strip of country between the Allegheny Mountains and the Atlantic Ocean." (Year Book, 1896, Illinois Society, Sons of the American Revolution.)

That these volunteer militia sometimes turned their thoughts to "home and friends they loved so dear" is most true, however, for Clark in his address to them just before the capture of Kaskaskia said:—

"We are not fighting alone for liberty and independence, but for the defense of our frontiers from the tomahawk and scalping knife of the Indians. We are defending the lives of our women and children, although a long distance from them. The British garrisons furnish the Indians with powder and lead to desolate our frontiers and pay gold for human scalps. We must take and destroy these garrisons."

And they did. Thus you see they defended the frontier and their women and children by going beyond them.

This was all British domain at that time. The first Europeans to take possession of this territory and garrison it were the French, and the treaty of April 11, 1713, between England and France, it was stipulated that the Mississippi Valley belonged to France. They, by the treaty of 1763, ceded it to the English, who made it a part of the Province of Quebec. It was captured from them, occupied and held for Virginia by Clark and his Vir-

ginia volunteer militia, his own regiment and others until the close of the war. The names of the officers and men of Clark's regiment may be found in the year book of the Illinois Society of the Sons of the American Revolution. One of his sergeants was the first Governor of Illinois.

At the close of the war, on March 1, 1784, Virginia presented this large domain to the United States, making one of the conditions in the deed that the United States should set aside not exceeding 150,000 acres for the purpose of rewarding General Clark and his officers and men. The effect of Col. Clark's expedition, at the time, was to give greater security to the western frontiers during the balance of the war.

And then, how momentous the consequences! If it had not been for Col. Clark, I born and raised as I was, in this locality, might now be a Canadian or some other sort of a provincial Britisher and as enthusiastically opposed to the National Guard *as soldiers* as is Lieut. Birkhimer.

The sequence of this action of the volunteer militia of western Virginia, in taking the great Northwest from Great Britain and holding it for five long years and presenting it to the United States, occurred during the late war, when the volunteer militia of Ohio, a part of the territory so secured by Clark, crossed the Ohio River the other way and entered upon what the Legislature of Virginia and what the Confederate States of America assumed they had made territory *foreign* to the United States, and took possession of West Virginia, before the United States Government had had time to organize, arm, equip, and drill her new army. They held it until the general government found time to pay some attention to it and them. They then became a part of the new army and helped to hold West Virginia to the end of the war, and thus secured an additional bright star in the emblem of our nation's glory. By their action they prevented our Eastern States from being partially separated from the West during the continuance of the war by a fortified mountain range in the possession of the enemy, extending as far as Wheeling, on the Ohio River.* To retake the other end of Virginia, for the retaking of which the United States organized a splendid army of long service men after the war had begun, cost forty times as much in men, money and lives lost which largely was *because* of the time

* "Ohio Militia and the West Virginia Campaign." By Henry B. Carrington, Colonel U. S. Army.

consumed in getting ready, during which time Richmond, Petersburg, Fredericksburg, etc., were fortified and garrisoned.

In these campaigns conducted by Virginia volunteer militia in Illinois and Ohio volunteer militia in Virginia, the troops were compelled to and did penetrate much farther into the enemy's territory than New York and Pennsylvania National Guard would have to penetrate British territory to reach the Welland Canal, and in neither case did they have one quarter the advantages or facilities the National Guard of the present time enjoys.

No expedition of any kind of United States' troops beyond our own boundaries ever lasted as long or has been as permanent or as great an influence upon the destinies of our country and our people as this of General George Rogers Clark and his Virginia volunteer militia.

Bancroft, when about to tell this story, says: "An enterprise is now to be recorded, which, for the valor of the actors, their fidelity to one another, the seeming feebleness of their means, and the great result of their hardihood, remain forever memorable in the history of the world." (Bancroft's History of the United States, Vol. 10, p. 193.)

VOLUNTEER CHARACTER OF THE NATIONAL GUARD.

That the first great condition determining the efficiency of a State force to be organized is whether the service shall be voluntary or otherwise. The compulsory plan was adopted by Act of Congress May 8, 1792, one hundred and four years ago. The best and most thoughtful statesman as well as military men have tried to have this law changed, advocating the volunteer system for training a few of the citizens as volunteer militia instead of the compulsory plan which uselessly provided for training all and necessarily resulted in training none.

The National Guard Association of the United States collected and published in pamphlet form many expressions from leaders in Congress and from Presidents' messages commencing with Washington and ending with Grant, favoring a volunteer service. Lieut. Birkhimer has quoted some of them. If he had had the pamphlet referred to, it would have facilitated his work a great deal. I will quote some more, commencing with Washington's, written one or two years after this law went into effect, showing that its defects were at once manifest.

"The devising and establishing of a well-regulated militia

would be a genuine source of legislative honor, and a perfect title to public gratitude." (President Washington, 1794.)

"Time is wearing away some advantages for forwarding the object, while none better deserves the persevering attention of the public councils." (President Washington, 1795.)*

"I cannot, then, but earnestly recommend to your early consideration the expediency of so modifying our militia system as, by a separation of the more active part from that which is less so, we may draw from it, when necessary, an efficient corps fit for real and active service and to be called to it in regular rotation." (President Jefferson, 1805.)

"A militia so organized that its effective portions will maintain the public interests while a more permanent force shall be in course of preparation. But much will depend on the promptitude with which these means can be brought into activity." (President Jefferson, 1806.)

"I earnestly renew, at the same time, a recommendation of such changes in the system of the militia as, by classing and disciplining for the most prompt and active service the portions most capable of it, will give to that great resource for the public safety all the requisite energy and efficiency." (President Madison, 1814.)

"The organization of the militia is yet more indispensable to the liberties of the country. It is only by an effective militia that we can at once enjoy the repose of peace, and bid defiance to popular aggression; it is by the militia that we are constituted an armed nation, standing in perpetual panoply of defense, in the presence of all the other nations of the earth." (President Adams, 1825.)

"Occurrences to which we, as well as other nations, are liable, both in our internal and external relations, point to the necessity of an efficient organization of the militia." (President Jackson, 1835.)

"I invite your attention to the plan which will be submitted by the Secretary of War, for the organization of volunteer corps, and the instruction of militia officers, as more simple and practicable, if not equally advantageous as a general arrangement of the whole militia of the United States." (President Van Buren, 1837.)

"The most important of them is the organization of the

* Then as now old soldiers were passing away to the eternal camping ground.

militia on the maritime and inland frontiers. This measure is deemed important, as it is believed that it will furnish an effective volunteer force in aid of the regular army, and may form the basis for a general system of organization for the entire militia of the United States." (President Van Buren, 1838.)

"In all cases of emergency, the reliance of the country is properly placed in the militia of the several States; and it may well deserve the consideration of Congress whether a new and more perfect organization might not be introduced, looking mainly to the volunteer companies of the Union for the present, and of easy application to the great body of the militia in time of war." (President Tyler, 1843.)

"I earnestly recommend that the attention of Congress be invited to the subject giving substantial encouragement to the formation of volunteer militia organizations in every State, and in the District of Columbia, by liberal appropriations to supply the necessary arms, equipments, tents, ammunition and other ordnance stores. With our small standing army our main dependence for public defense must be on our militia, and the wisdom of the comparatively small expenditures which would encourage their organization, and their efficiency in drill and discipline, seems apparent." (Robt. T. Lincoln, Sec. of War, Report Nov. 15, 1883.)

All that my critic has said in favor of volunteers applies with most peculiar and particular commendatory force to the National Guard. The statutes of my own State provide (Sec. 1 of Military Code of Illinois) as follows:

"That all able bodied male citizens of this State, between the ages of eighteen and forty-five years, except such as are expressly exempted by the laws of the United States, or are State or county officers, or on account of their profession or employment are exempted by the Commander-in-chief, shall be subject to military duty and designated as *The Illinois State Militia.*"

"The active militia shall be designated as the *Illinois National Guard* * * * enlistment therein shall be for three years." (*Ibid*, Sec. 3.)

I have heretofore referred to the National Guard of my own State and their enlistment oath. I will illustrate the statutes of all the States further by giving some sections from the statutes, rules and regulations of the National Guard of the State

farthest away from my own home, the State of Washington:

Statute, Sec. 8.—All persons subject to military duty under the laws of this State, and not exempt therefrom by the provisions of this act, and such other male persons who shall voluntarily enroll themselves, shall be divided into two classes, to wit: One consisting of those who enlist in the active militia of the State under the provisions of this act, which shall be known as the *National Guard of Washington* and the other to consist of all those subject to military duty, but not included in the above active or enlisted militia; the latter class to be known as the *Washington Reserve Militia.*

Ibid, Sec. 14.—All enlistments in the National Guard of Washington shall be for the term of three years, and the military board shall adopt such muster-in form, oath or affirmation and triplicate muster-in papers, for the provisions of carrying out this act; * * * the signing of said papers and taking the oath as above required upon enlistment shall constitute a valid enlistment for three years in the National Guard of Washington.

Regulations, Sec. 10.—The militia of Washington is divided into two classes: *First*, the inactive militia, consisting of every able-bodied male citizen of the State of Washington between the ages of eighteen and forty-five years, who are citizens of the United States, excepting persons exempted by the laws of the United States and by the laws of the State, and *shall be known* as the *Washington Reserve Militia.* This force is subject to no active duty, except in time of war, invasion, rebellion, insurrection or riot, or reasonable apprehension thereof, when the Commander-in-chief may order out for active service such portion of the *militia* as he may deem necessary to execute the law, suppress riots or insurrections, or to repel invasion, as the case may be, *designating the same by draft if a sufficient* number do not volunteer; and when so ordered out for service the *militia* are subject to like regulations and receive from the State like compensation as that prescribed for the *National Guard.*

Ibid, Sec. 11.—The active milita, *known* as the *National Guard* of Washington, is composed of *volunteers who are regularly enlisted, uniformed, armed and equipped* in accordance with the laws of Washington and regulations of the National Guard, and of such strength as the Legislature may from time to time determine. This force is liable at all times to be ordered into active service, and shall be called on by the Commander-in-chief

for military service whenever he deems it necessary and proper.

Ibid, Sec. 35.—The mustering officer will be furnished with blank muster-rolls from the Adjutant General's office, together with enlistment oaths in form as follows:

OATH OF ENLISTMENT AND ALLEGIANCE.

State of Washington } ss.
County of———— }

I ————, born in ————, in the State of———— ————, aged —— years, —— feet —— inches in height, —— complexion, and by occupation a ————, being a resident of ———— county, State of Washington, do hereby acknowledge to have enlisted in Company —— of the ——— Regiment, a duly organized company of the National Guard of Washington, for the term of three years unless sooner discharged by proper authority; and I do solemnly swear (or affirm) that I will support the *Constitution of the United States*, and the constitution and laws of the State of Washington, and bear true allegiance to the same; and that I will yield a prompt obedience to all orders and instructions from my superior officers, and to all laws and regulations promulgated for the organization, government and discipline of the National Guard of Washington. So help me God. Signed ————. Subscribed and sworn to before me this —— day of—— 18—.

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CERTIFICATE OF COMPANY COMMANDER.

I certify on honor, that I minutely inspected the *volunteer* ————, previous to his enlistment, and that he was entirely sober and of good report when enlisted; that to the best of my knowledge and belief he is of lawful age and subject to military duty. This soldier has —— eyes, —— hair, —— complexion, is —— feet —— inches high.

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Commanding.

I have already shown that the National Guard are in fact doubly volunteers, not only volunteering to serve but also volunteering to prepare themselves in advance of need, to serve promptly and efficiently. They are also volunteers in the sense

of being in many States organized in the beginning largely of returned volunteer soldiers of the late war.

THE NATIONAL GUARD—WHY SO NAMED.

My critic expresses the hope that the militia are not ashamed of their constitutional designation. I see no reason why the militia should be. The term includes all men between the age of 18 and 45, not in Government employ and who are of sound mind and body.

"They are the citizens, and often the most enterprising of the citizens of the State. Upon them or men like them the honor and perpetuity of the nation rests. But when it comes to organizing them into State forces"—it depends on how you do it.

The defect with the United States statute in force these hundred years, is that it pretends to put men in an organization where not one in twenty is willing to go and not one in twenty is needed. The nineteen unwilling ones would not learn and they would not permit the twentieth man to do so when he wished to. This institution has been popularly known as the militia since that act of Congress.

The twentieth men sometimes got together voluntarily and organized volunteer companies of State troops. Their numbers were too few to do the good they could and would have done if there had been more of them. In most of the States they volunteered during the late war. After the war, the returned soldiers in most of the States organized a large number of such volunteer companies. The States seeing the possibilities of great good in these voluntary companies began to recognize them by statutes and to grant them support. They thus become a permanent institution throughout the country, generally under the name of the National Guard and have steadily advanced in efficiency. It will thus be seen that the National Guard is a different organization from the old militia, composed of a different class of people, acted upon and governed by different motives and impulses and acting under different laws, and to whom the principles of the United States Constitution apply in a different way from that in which many have thought they applied to the old militia, and in the usage of correct writers it goes by a different name. Of course the entire National Guard are militia in one sense of the word, as all National Guard soldiers are citi-

zens and they are not ashamed of either name, but not all militia are National Guardsmen, neither are all citizens National Guardsmen, and when we speak of the National Guard, having reference to their military character, it is not correct writing to designate them as citizens or as militia. "Able bodied male citizens" and "militia" seem to be nearly synonymous terms.

In the same paper in which my use of the term National Guard is criticised perpetual confusion is manifest as to the kind of troops referred to, which shows how very necessary is some new term, provided progress is to be made in arriving at the truth. It is asked "Does the Colonel suppose that a mere change of designation will affect the nature of a military institution?" No, but I think an accurate use of names might enable a writer to know himself what kind of military institutions are under discussion and might enable him to convey some ideas to the minds of others free from the confusion otherwise resulting.

If the volunteers Mr. Cheves was seeking to have organized had been called "State Militia" or "State Volunteers" or "National Guard," perhaps Lieut. Birkhimer would not have fallen into the error in the first place of believing that because they were militia they could not pass the border, and in the next that because they were "Volunteers" they were not *volunteer militia*.

If separate and distinct names had been applied to each kind of troops and the distinct names had been properly used, a large portion of the recent discussion would have been avoided. Arguments were used against the ununiformed militia who were supposed to be made quasi-soldiers by serving them with a notice to equip themselves with a cornstalk or spontoon, that would have required no attention if the confusion arising from the use of the common term militia, had not made these objections seem to avail against the active volunteer, drilled, uniformed and disciplined National Guard.

When legislatures and law makers define a term, it is for the purpose of enabling writers and speakers to convey clear, correct and definite ideas by the use of a name for the thing it represents without defining the thing every time. Most of the States have defined "The Militia" by statutes and have also provided for a volunteer corps of State troops and given them a special name by which they are known and designated by correct writers and speakers.

I advocated the name Volunteers in the convention in my

State that chose the name National Guard. The discussion showed that the officers present believed the word Guard indicated a higher degree of drill and especially of discipline than the word Volunteers, and they all aspired to the highest degree of both these desirable qualities.

A majority of those officers had at that time lately been engaged in a great war to determine whether or not our nation was soluble in hot politics. They had concluded that it was not and ought not to be, and that, hereafter at least, they might be safely counted upon as defenders of the nation, hence the name National Guard. I now think they were right. It is one of the good things in the bill now pending before the Senate that it gives a good description and a definite name to the volunteer State troops in naming them the National Guard.

SHORT WARS AND ADEQUATE PREPARATION.

My critic is a little facetious on the point of short wars mentioned by me. He seems to look at that from one side only, while there is another side as important as the one he seems to see. What kind of a figure would the Emperor of France have cut if he had been trying to organize an army after Emperor Wilhelm and Count Von Moltke had entered his empire? How much of an army could he have organized, drilled and equipped in his spare hours during the forty days which elapsed between the declaration of war by himself and his being made a prisoner. Or would he after that event ask permission to go home and be allowed a portion at least of his empire undisturbed in which to prepare an army for a fresh encounter?

What could Austria have done in the way of organizing an army, arming, drilling and equipping, mobilizing, concentrating and using it during the thirty-four days that passed between the time war was declared and the time when she was compelled to surrender? Or what could she have done in that matter later with her territory in the possession of the enemy.

The failure of Gambetta's attempt to organize a force against the Germans after the invasion of France is an example.

No patriotic soldier ever proposed for a moment to dispense with a volunteer army. On the other hand, every such soldier would advise organizing one abundantly large as quickly as possible after war is begun or declared, arming, equipping and drilling the troops and forwarding them as rapidly as possible to the

scene of action. Nothing can possibly be so expensive in all that we hold dear, as going to war with too small an army, or getting it into the field too late.

But it is, nevertheless, expedient to have a National Guard organized and ready at a moment's notice to prevent an invasion, which invasion itself might prevent the organization of a volunteer army. The presence of an enemy's troops would be very embarrassing to say the least, at a camp of instruction and would seriously interfere with the lieutenant in his endeavors to drill and discipline his recruits, however high his enthusiasm might run. A hundred or a hundred and fifty thousand National Guard to respond at once in connection with the Regular Army, and protect our camps of instruction and our lines of communication, as well as our homes, from interference, acting and fighting on both sides of our frontier lines, and taking possession of the enemy's lines of transportation and strategic points, if necessary, would be very convenient indeed. And, besides, as shown, I think, in my last paper the volunteer drilled militia are extremely useful in organizing, drilling and disciplining an army of volunteers, while the local character of the organization is such as to enable them very easily to recruit their own ranks. In fact the Volunteer Militia or the National Guard, as they are called, form the volunteer army, camping at home in time of peace, waiting for the bugle call. When war is declared they, all of them (and with ranks greatly increased) embark in the war. When the war is over they return again to their homes, to serve many of them as members of the National Guard.

If the United States had been compelled to wait until it had enlisted, organized, equipped and drilled an army to hold Washington at the beginning of the late war, the national capital might have fallen into the hands of the enemy and the permanent dissolution of the Union been acknowledged by our enemies across the sea, who were only waiting too anxiously and too expectantly for that as an excuse.

To have waited to organize an army after hostilities had begun would have been too much like "locking the stable door after the horse was gone," or more literally "putting out the cinders after the house was burned." Too much like the "On to Richmond," we heard so often. In the nick of time two regiments of National Guard flew to the defense of the capital, almost as fast as transportation could carry them. Neither is it

true that while they marched "toward the enemy their thoughts, hope and affections travelled in the other direction," unless, perhaps, it was to incite them to greater sacrifice and heroic deeds of patriotism, for the honor and safety of the loved ones left behind, for we see by the record that the Sixth Massachusetts were earnest enough before the war was over to develop 136 commissioned officers in their own regiment, and when the regiment reënlisted there were 57 of the men of '61, to reënlist, notwithstanding 464 had gone elsewhere in the service and many of them held very high offices. The most of the members of the other regiment, the 7th N. Y., *remained in the service*, with thoughts perhaps still clinging around the loved ones, for we know

> The bravest are the tenderest,
> The loving are the daring.

They remained long enough for 660 of them to earn commissions besides some more humble who served to the end in the ranks. The regiment as an organization after thirty days service returned to its home station and was there kept up during the rest of the war as a defense to the city, filling constantly the places of those who remained at and went to the front with new recruits.

"Short wars, indeed!" Well, it is best we do not feel too complaisant about our enemy not being able to make the war short if we are not prepared; or if not that then awfully expensive to us in life and property.

Gen. Miles, Commanding General of the U. S. Army, in a recent article cites facts to show that hereafter the importance of the first move for position is so great that hostilities are likely to be actually begun and places occupied before war is declared or the opposing side has any notice other than the beginning of the battle. ("War," in the *Cosmopolitan* for June, 1896, No. 143.)

Our country is much more likely to suffer from the idea that it can enlist, organize, drill, discipline and equip the necessary troops, and teach them how to use their modern military arms after the war has actually begun, than it is to be injured by the expectation that wars will be short, or from an over confidence in the National Guard.

If we start in promptly enough and with a large force of trained troops, even if a large portion of them are National Guard, we will be able to hold on to the end, but if we are en-

tirely unprepared when we start, with an enemy who is well prepared, we will suffer fearfully, to say the least.

What would the Lieutenant have us do when war was declared, or begun without being declared? Would he have us petition our enemies who were all ready to strike our nation's vitals and request them to defer active operations until our army and our National Guard could have time to organize a large new army? If that would not be a suicidal policy, what would?

If either side of the contest could have had a hundred such regiments as the Sixth Massachusetts or 7th N. Y. at the beginning of our late war and had used them promptly to take possession of and hold strategic points and lines of transportation, it would have so prevented organization and combination on the other side that the war would probably have been a short one. Certainly the length of time that war lasted is no criterion for wars in the future, for in that case neither side was ready and they did not try to get ready in earnest until they had wasted more time than would have been necessary to finish the war if one side had been ready in the beginning and the other unprepared. The first year was spent in manœuvring for political rather than military position. As much effort and management was necessary on either side to enlist its own citizens in support of the Government as to enlist soldiers for the battle line.

THE QUEENSTOWN AFFAIR.

I do not wish to enter upon a comparison of records of the National Guard and the Army and will not. That is the reason I have declined to take up the old Queenstown quarrel. There is no body of men entirely infallible. The Lieutenant seems to be determined to provoke such a comparison and has persistently referred to that unfortunate affair. I will not attempt to say whether the ununiformed militia who were there, or the somewhat well organized volunteer State troops, or the regulars, or the boatmen who ran off with the necessary boats were most to blame for the result. The powder smoke had hardly cleared away before an acrimonious discussion of this subject arose between all classes and has been kept up too long already.

I will say, however, because this is not disputed, that the first detachment that crossed were three hundred volunteer militia with three hundred regulars. Six hundred was all that could be taken over in the boats at one time.

INSTITUTIONAL CHARACTER OF OUR GOVERNMENT.

Our government, as I pointed out in another paper, is an institutional government, constructed upon the theory of the "Preacher" who said "A three-ply cord is not quickly broken." (Eccl. iv-12.) Our great cities are protected from lawlessness, first by their mayors with the police force. Ordinarily this ought to be sufficient. There are times however when persons may be elected to office whose political sympathies are stronger than their desire to enforce the law, and we may believe that they sometimes honestly differ as to how laws should be enforced. We, however, have this provision, that if the city itself fails to maintain order, it then becomes the duty of the Governor of the State. It is supposed that he will execute and administer the law, but he too may have his peculiar opinion as to what should be done. The National Guard is the instrument in his hands and with it he acts.

In case the mayor of the city and the Governor of the State both fail, we still have the other strand of the three-ply cord. It is the President with the Army and the National Guard at his command. But Presidents are not infallible any more than mayors and governors, and it would be the greatest folly, for reasons much too numerous to mention here, to abandon the two local governments and rely upon the general government alone.

One of the early Vice-Presidents of the United States, Aaron Burr, came within the small fraction of one vote of being the President. During his term of office he was indicted for murder and in less than three years after the expiration of his term of office, he was tried for treason. His trial lasted all summer and he was only let off with the Scotch verdict that "the offense had not been sufficiently proven."

Many of us can remember when a President of the United States, Andrew Johnson, was undergoing an impeachment for the purpose of removing him from his high office, also when the Secretary of War and the General of the Army remained in their offices night and day for fear the President might issue some orders by which a great conflict might be precipitated.

If Lieutenant Birkhimer will recall the events of the past few months he may perhaps agree with many others that it was only the accident of foreign birth that prevented the Governor under whose eye he saw "the uprising" in Chicago at one time "devel-

oping into formidable rebellion," and whom he so severely condemns, from being the successor of the President and Commander in chief of the Regular Army, whom he commends, so far at least as the nomination by the great party which placed them both in the exalted and responsible positions they now occupy, is concerned.

Under such circumstances, and with all these facts in mind, our citizens must feel much safer when they reflect that their security does not depend upon the President of the United States and the Regular Army alone, and although the general government might for a time be thrown into great confusion by a disputed presidential election or a misguided President, the State government would still go on and the laws be enforced at home in the regular way. This three-ply character of our government is one of its chief characteristics that lead us to hope it may be perpetual.

It is one of the most admirable features of the pending bill that it does not seek to merge one of the strands of our "three-ply cord" into another. The great cables which sustain the Brooklyn bridge are known to be safe, but if those huge cables were welded into one great rod of iron, even though they might be much enlarged, no competent engineer would be willing to trust them for a moment.

RESPONSIBILITY OF THE GOVERNOR.

There is a persistent effort upon the part of some to discredit all reliance upon the National Guard as a national defense because, as it is said, the Governors might not respond promptly to the call of the President. This very fact that the National Guard is not at all times autocratically under the command of the President without reference to the judgment of any other officer is perhaps one of the chief facts that make it possible to have a strong military force within our immediate reach without danger to our institutions and our liberties.

Of course it is pretty hard to give an officer power for good without also giving him power for evil, but if ever the ingenuity of man has devised such a scheme, surely our fathers did it when they drafted the provisions of the Constitution with reference to our militia.

The law should not put a President in a position to carry on a great war contrary to the judgment of the Governors of the

States and without the approval of Congress. This was not permitted to the kings of England in the times of their greatest power.

Presidents are men of about the same character as Governors, and they have no divine guidance or infallible wisdom that Governors do not have. There is no reason why we should not place some confidence in our Governors' wisdom and integrity while we place a great deal in that of the President. The best and ablest men have not always been elected President.

Under our Constitution Congress has the power "to provide for calling forth the militia" and "the President shall be Commander-in-chief of the militia of the several States when called into the service of the United States."

The Supreme Court has decided in language so positive as to admit of no doubt and too clear to admit of misunderstanding, that Congress has power to provide that the order of the President shall put the militia at once into the service of the United States, and if pursuant to such a law they are ordered and do not obey they may and should suffer such punishment as a court-martial might under the law inflict.

This construction of these provisions of the Constitution by the Supreme Court was reaffirmed by the arbitrament of war and has been loyally and fully acquiesced in by the great mass of the people and will never be seriously questioned again.

There is not a particle of doubt but the National Guard would respond promptly to any call to arms made pursuant to law by properly constituted authorities. Now it only remains for Congress under the Constitution to determine how the militia shall be called forth and by whom.

The framers of the Constitution did not see fit to provide that the President should call them forth, which they could have easily done. They thought best that Congress might ordain the manner and means of their calling.

It was the desire of the fathers manifestly, that the President should have all necessary power, but they did not desire to make him an absolute autocrat.

It is therefore best and wisest that Congress should provide that the President shall make his requisition upon the Governors of the States.

The National Guard are State troops, supported almost entirely at the expense of the State and at their own expense, and

it is proper that they should be transferred into the service of the United States and put under the command of the President through the medium of their Governors, for several reasons, to only a few of which I will refer in this paper.

The Governor is certainly the Commander-in-chief of the National Guard of his State and it is proper and right that he be recognized and trusted as such.

What would be thought of a corps commander who should send his orders to the regimental commanders for fear the brigade and division commanders would refuse to act? If demoralization did not already exist in such a corps I think it would soon permeate it from top to bottom.

It is always best when possible to send all military orders through the regular channels and certainly to send a requisition for the National Guard of a State to the Governor and Commander-in-chief of that guard, he being then and there in command thereof, is the only way to use the regular channels. (McCall's case, 5 Phila., p. 268; Rawle on the Const., p. 160; Martin *vs.* Mott, 12 Wheaton, p. 19; 33 Houston *vs.* Moore, 5 Wheaton, 1, 37; JOURNAL OF THE MILITARY INSTITUTION, p. 925, Sept., 1894.)

The National Guard could be placed upon the trains, moved to the desired point and reported to the proper officer more quickly and more harmoniously and comfortably by their Governor and their regularly constituted officers and according to their previously arranged plans of mobilization, than in any other way.

A Governor would not dare, or even feel inclined, to refuse the President's requisition for troops except in a case where the proposed war was very decidedly against his own judgment and the judgment of the people of his State.

The Governors would respond as promptly as the electric wires could carry their reply and the express trains could carry their troops, and if there were a few whose judgment compelled them to refuse, the campaign could be carried on with the troops of those States that did respond until Congress could be convened, which would take but a few days. If the exigencies of the case required it Congress could then enact a law under which the President might issue his orders direct to the National Guard of the States whose Governors had been delinquent and such an order based upon such an act would command instant obedience.

If upon the assembling of Congress it also should disapprove of the action of the President, and should refuse to declare war, and furnish the President the necessary troops in some way to carry it on, it would become his duty to exercise his constitutional function and by and with the advice and consent of the Senate make a treaty of peace.

> "Beware
> Of entrance to a quarrel; but, being in,
> Bear 't, that th' opposer may beware of thee."

is as good statesmanship now as it was fatherly advice in the days of Hamlet the princely Dane. It is well to guard the beginning of a war, so that it may not be too freely entered into upon the whims or mistaken judgment of any one man, even though he be President of the United States. This bill seems to be drafted somewhat upon this princiciple, for, while it will require the action of either the Governors of the States, which can be instantly obtained, or of the Congress of the United States, which could be obtained in four or five days, to place the National Guard at the service of the President, the Constitution itself makes him the sole Commander-in-chief as soon as the National Guard is once in the service of the nation. Under the provisions of this bill the National Guard would be called into the service of the United States in just the same manner that President Lincoln called them into service during the late war, and experience has abundantly shown that to be the best way.

RECENT SERVICE OF THE NATIONAL GUARD.

If the people of any State desire a good National Guard and will take the means to procure it, they will get it; and it does seem to me the part of patriotism and wisdom for all men who profess to know anything about military matters to encourage every State to organize such a National Guard and not to discourage them by belittling the organization.

My critic refers to some recent action of the National Guard of "a particular State" which refused to obey orders and refers in some insinuating way to some other State, while referring directly to the action of the National Guard of my own State. As to the action of the National Guard in other States, I am unable to answer specifically to a vague suggestion, as I do not know to whom he refers nor to what action, and if I did and should investigate the matter thoroughly it might even then be a doubtful

question as to who was the most to blame, the National Guard, the State Executive who issued or failed to issue proper orders, or the Legislature which made or failed to make the needed laws.

If we expect the National Guard to continue their usefulness, we must permit them to retain their respect for themselves as soldiers. For if experience should show that they cannot make honorable and trustworthy soldiers of themselves when they try, self-respect as men (and they are honorable, high-toned men) would require that they should abandon the attempt and cease to exist. But history does not show anything to discourage them. They have met with their difficulties, mistakes and failures, but their record taken together is one of which they might well feel proud, though having an "aspiring" character as well as name, they probably would be glad to see that record improved. It is not right to ransack history to find instances of their failure and overlook all the good services they have rendered from the time they saved the remnant of Braddock's British regulars to the time they saved Chicago. The history of our country could not be fairly written with the acts of our volunteer militia left out. Notwithstanding it is only recently they have had any reasonable recognition and never have received the favorable recognition they have deserved. The Government cannot do without a military force and has several kinds. Among them the National Guard. In view of the little aid it receives it does very good work and with every year its standard of drill and discipline is being raised.

The professional military man, by his training, becomes more positive and prompt in his ideas as to how misguided people should be treated than other men. It is not necessary for me to make any remarks or comment upon the way in which the great railroad strike in my State was managed in 1894. The responsibility was upon the Governor, and he seems perfectly willing to assume it all, and he seems to be pretty well supported by the great party which elected him to his high office. I do say, however, that the National Guard of Illinois then did all they were commanded to do and did it as well as any troops could have done it. If they did not do the things the Lieutenant thinks they should have done, his criticism falls upon the Governor and not upon the National Guard. If a military body does all that its Commander-in-chief desires and does it to his satisfaction, it is to their credit *as soldiers*, rather than otherwise, that they did not

take matters into their own hands and undertake to do more than he required.

That the National Guard of Illinois did all that the Governor wished is evident from his own words:

"EXECUTIVE OFFICE,

"SPRINGFIELD, August 11, 1894.

"To the officers and men of the Illinois National Guard:

"The gratitude of the State of Illinois is hereby expressed to you for the sacrifices you have made and the splendid services you have just rendered. At a flash from a telegraph wire you left all your affairs and reported 'Here' at the roll-call. In from five to eight hours after orders were issued at Springfield, you reported for duty at points more than a hundred miles from your homes. In several cases entire regiments were mobilized and transported upwards of two hundred miles to a seat of trouble in a few hours.

"No standing army ever acted with more celerity in any country. Illinois, having the largest coal field in this country, and Chicago being the railroad centre of America, both the coal and the railroad strikes were more intense here than elsewhere.

"To deal with disturbances growing out of such conditions called for more than mere bravery. It required intelligence, discretion and judgment; and both the officers and the men of the guard met the highest requirements. You have again demonstrated, as was done in the sixties, that a citizen soldiery, coming from an intelligent and free people, and imbued with a high sense of the duty of citizenship is the best in the world.

"You were ordered to many points in the State, and everywhere did your duty promptly and thoroughly. You restored order and assisted the civil officers in enforcing the law. Especially was this true in Chicago, where three brigades were on duty. There both the weather and the physical conditions were extremely severe, but you did your duty without a murmur, and earned the praise of every man who loves free institutions.

"The great State of Illinois appreciates your worth and hereby thanks you. JOHN P. ALTGELD, Governor."

Should the pending bill become a law in its present form it will, in the language of Washington above quoted, "Be a genuine source of legislative honor and a perfect title to public gratitude," to the administration that devised it, and the Congress that enacts it.

MARCHING SHOES FOR TROOPS.

By First Lieut. E. H. PLUMMER, R. Q. M., 10th U. S. Infantry.

IN a general way it may be said that the duties of a soldier are "to march and to fight." The "marching" usually comes first as well in practice as in this statement.

Victory, in the fight, depends, to a great extent, on the number of men engaged, or, on the strength of the command at the end of the march. It is all important therefore that the marching be done so as to impair the strength of the command as little as possible, collectively and individually. One of the most important factors in the accomplishment of this end is the shoe which the troops wear.

The shoes made for, and furnished our troops are not the best shoe for the purpose. How can we find that shoe?

How did we get the field cartridge belt? Was it not by adopting and adapting the methods used by those who spent the best part of their days, yes, and of their nights too, with their ammunition ever ready and convenient to the hand?

Where did we get the leggins? Was it from observation of the professional pedestrian, or from observing the infantry soldier with his trousers tucked in his socks, on the march, because his clothing furnishers were tardy to discover his needs?

How much longer must he wait and suffer before we duly consider the needs of his all important foot and the imperative need of fitting it with shoes suitable for marching?

Is it not important that we should begin to consider whether we can longer afford to use defective shoes on the feet of our troops?

Let us consider, for a few moments, the act of walking and the best method of shoeing the foot, to accomplish it with the best results, and then seek for a possible solution of the problem in the methods of those who use the foot to the best advantage.

In the act of walking the foot is put forward, and should reach the ground nearly flat; the toes should be first to reach it, not the heel, which could not do so without some concussion. The muscles of the calf of the leg allow the heel, with firmness

and precision, but gently, to touch the ground, and the step is completed.

A springing gait is not due to a yielding of the arch of the foot but to the heel being gently lowered and firmly raised; and upon this the grace of walking depends.

The position of the foot is important and should be considered. To turn out the toes seems to be unnatural and is objectionable for several reasons. The toes should be directed forward, the inner margin of the feet parallel, that the propulsion of the body onward from, and the consequent thrust backward on, the foot, and especially on the great-toe, should be in the direction of its length rather than obliquely across it; not only as giving a firmer bearing from which to propel the body onward, but as diminishing the friction on the sole and consequent tendency to foot-sore.

By standing bare-foot and springing forward it can readily be seen how much more tendency there is to slide on the sole when the foot is turned out than when it is directed forward.

It would seem that in standing more steadiness is gained by decreasing the angle between the feet, as falls generally occur toward the front.

Now as to the shoe.

The perfect shoe should conform as nearly as possible to the outlines of the foot.

The tendency of shoe designers and shoe makers is, however, to entirely disregard this and to strive only to make a symmetrical covering for the foot, regardless of adaptability and comfort.

It is of first importance that the sole of the shoe should allow the great-toe to occupy its natural position: the sole should therefore be straight or nearly so, on the interior margin. The upper leather on this side should be correspondingly formed so that the great-toe will find plenty of room in its natural position and not find it necessary to push over toward the middle of the shoe, as is the case in shoes as they are usually made. It is obvious that a flexible material fixed on both sides and loose between can be drawn farthest from the surface to which it is attached, in a line midway between the fixed parts. For this reason the highest part of the foot, which is the inner side, will, in any case, have some tendency to go to the middle of the shoe where most room can be made; this tendency is largely and needlessly aggravated by the high ridge of the shoe-last being along the middle line instead

of along the inner margin. But not only ought the room there given to be much more according as the foot projects upward but it ought to be proportionally more. Over (not by the side of) the ball of the great-toe is special room required. The lateral thrust, too, already spoken of as the consequence of turning out the toes, tends much to displace the foot and force it against the outside of the shoe. Toe-caps are objectionable, as giving most room in the middle line and inviting the great-toe to occupy that position.

No useful or truly ornamental purpose is served by leaving unoccupied and unnecessary space on the outer margin of the sole, beyond the place for the little toes. No angle exists in nature, on this side of the foot and none should be represented; the outline of the sole should conform to that of the foot.

As already stated, grace in walking, as well as the free propulsion of the body onward are due to letting the heel down with gentleness and precision, and raising it with firmness and vigor, it follows that none of these can be if the shoe prevent the heel from going down, a necessary antecedent to springing up. A low heel is therefore imperative. The perfect shoe should have none.

Some turning up of the shoe will, unavoidably, result from walking, but there is no reason that it should be aggravated by the shoe last turning up. In it the sole should be flat to the end. This will permit the toes to come to the ground, which is necessary to obtain their complete and best action.

So much for theory. What do we find in practice?

Do we find the professional or the amateur pedestrian with a footgear similar to our army shoe? We do not, but we most certainly would, if the army shoe was the best shoe in the world for marching, as it ought to be.

What kind of a shoe do we find on the ball ground, in the tennis court and the gymnasium, where the owner clothes his foot to get from it all that nature permits, and with the least wear and tear? Do we not find a shoe without a heel and made to conform to the outlines of the foot?

What is the characteristic of the Indian footgear? and who can get more work out of a foot with less wear and weariness than an Indian?

Must we think that because the Indian, with his heelless moccasin, shaped to his foot, can make long marches with comparatively little fatigue, that his foot is differently constructed or his muscles better fed than those of our soldiers? Not at all.

But we do see that those who desire to get the best work out of the foot, with the least wear, adopt a shoe constructed approximately in accordance with the theory I have stated, and that the Indian, who clothes his foot in a similar manner, gets a maximum amount of work out of it with the least wear and tear.

It is time that a suitable shoe for marching should be made for and furnished our troops.

We have given them "barrack shoes," "post shoes," and the so-called "campaign shoes;" why not give them a "marching shoe"?

Any decent foot covering may serve for post duties, but when marching is necessary something more is needed.

We may teach the manual of arms with a wooden gun or a stick. A sharpshooter might make qualifying scores with a muzzle loading rifle, but such an arm would be very much out of place on the battle-field of the present day.

Would it not be well for us to hasten to furnish our troops with a shoe for marching, more in accordance with their rifles than with the flint-lock muskets of their predecessors?

In this connection I will relate an incident that came under my observation during the Geronimo campaign in 1886.

An infantry officer, before starting out, procured a pair of oil-tanned moccasins, made in Dover, N. H., such as are worn by hunters and woodsmen. He is a man who never walks when he can avoid it. He was warned that the heelless shoe would break the arch of his foot, and that at the end of the first day's march he would be too lame to walk.

The first march was in the rain, over a slippery, muddy road. At the end of the march the 1st Sergeant of the company, in speaking of the difficulty of marching on such a road, said that some of the men were afraid that they would not be able to keep up on a long march, if the same gait was kept up and the roads were in similar condition. This march was only nine miles. The next march was twenty-two miles, over a road very good for marching, with the exception of about three miles of very heavy sand near the end of the march. At the end of this march the officer with the oil-tanned moccasins was asked where they could be procured, as the men were anxious to get some of them, being convinced that the officer's ease and comfort in marching was due to the shoes that he wore.

Six months later, when returning to his post with the same

company, out of twenty-one men in ranks, seventeen wore the oil-tanned moccasins.

It is hardly necessary to add that he was thoroughly convinced that the proper shoe for marching was a shoe without a heel and one allowing a free and natural movement of the muscles and bones of the foot.

OBSERVATIONS RESULTING FROM A LATE VISIT TO EUROPE.

By Brig-General M. D. HARDIN, U. S. A. (retired).

THE opinion expressed just before leaving home, "that there are now no veteran armies in Europe," is extended to the opinion that "there are now no reliable armies in Europe." The chief soldiery of Europe is simply "a National Guard." I do not believe any government in Europe could conduct a war any considerable length of time which was not popular with the masses,—except possibly Russia. The special corps (composed of men selected from the various arms at the end of one or more enlistments, therefore consisting of men aged from twenty-one to thirty-five years), appear to me to be the only reliable troops. The main body of the infantry (the back-bone of the fighting force) consists of mere boys.

Outside of Switzerland and "the Alps" (where the people make marksmanship a national amusement), the infantry is not taught the thorough use of their rifles, and there is not sufficient rifle practice. It would be impossible to make these callow youths take aim and husband their ammunition. This European infantry resembles our High School Soldiers. It makes a fine show before admiring crowds of thoughtless people. It is excellent at "Fancy Manœuvres." The extreme youth of the soldiers accounts for the frequent mutinies which occur. These mutinies have been punished in a different manner from what they would have been in former times. The material composing the great body of the armies is too lately from the people, and too young in years and experience, to carry out traditional punishment for mutiny.

I believe the modern rifle requires more steadiness and coolness under fire than such youths possess or can be trained to

have. The supply of ammunition to such youthful soldiers may well cause anxiety to their commanders. "Buck Fever" sometimes attacks "seasoned" soldiers, it is quite certain to affect these youths. I have witnessed it several times in action, once in a battery. Early in our late war, acting as aide to Col. Hunt, Comdg. Artillery Reserve, Army of the Potomac, I was directed to post a rifle battery on the left bank of the Chickahominy, with orders to caution the captain of the battery—which had not yet been in action—only to reply to the enemy's battery, posted on other side of the Chickahominy, and to fire deliberately. As our battery came "in battery," the enemy fired a shell. Expostulations, orders, oaths, all were of no avail, to cause our battery to cease firing till every round of ammunition was expended. This battery afterward became one of the most noted in the army for pluck, skill and coolness.

Last summer I wrote "What would become of a mass of such infantry if surprised by a few experienced skirmishers who made every shot tell." The terrible battle of Adowa in Africa is a fair answer. Gen. Baldissera is now calling for a few more battalions of those picked men of more than one enlistment—reliable soldiers.

The difference of ages between the officers and men was very noticeable in the Continental line infantry, even lieutenants appearing to be ten years older than the men, the field officers fifteen to twenty years older. Both in France and Italy the companies as turned out for drill were very small. In Italy the companies, except in special corps, were little stronger than ours. The Italian newspapers are now demanding that the companies be filled up. It seems to me that the military authorities in Europe have failed to appreciate the true advantage of the modern magazine rifle. When an engine on an Atlantic liner has been improved to the condition of being able to drive the vessel twenty odd knots an hour instead of ten, the number of engineers to care for it has not doubled, much less quadrupled, but the engineers in charge were required to know more about engines.

It seems to me that Continental Europe has lost its head on numbers to the neglect of experience, skill and perfection. Smaller armies of older men, more thoroughly drilled in necessary work and especially in target practice, with older non-commissioned officers and younger commissioned officers, would satisfy the needs of Europe and save some of the crushing burden of expense the people there endure.

We can learn little from Continental Europe in regard to our military establishment, except in regard to the defense of our sea-coasts and lake frontier. Why we should have continued so long in a "fool's paradise" as regards the proper protection of our coasts and lake frontier, is unaccountable to a military trained mind. That the loss of them to an enterprising enemy may not be the cause of an awakening is sincerely to be hoped. After our coasts and lake frontier are properly protected and a reasonably sized defensive navy built, the proper use of the modern rifle, is the important feature in the defense of our country. In order to accomplish this, the general government and the States should encourage target practice by every means in their power; should provide ranges free of expense; give prizes, not only to the National Guard, and to all legalized armed bodies, but should encourage target practice by clubs, etc. It is possible to teach all *absolutely necessary* manual of arms and drill in a few days to ordinarily intelligent men, but to learn to use the modern magazine rifle properly and most effectively, requires much time and attention. It can be easiest and most quickly learned in the form of sport, or in target practice for prizes. Money prizes as well as medals should be offered. The general government should encourage by prizes, practice by State National Guards and Naval Militia with sea coast-artillery.

In order to keep up with the improvements and inventions of the age our national Military and Naval Academies must be encouraged, also military instruction at our high schools and colleges. Our post-graduate military schools must be kept up to the times. At these latter *practice must not be sacrificed to theory.*

Socialism, great unrest and dissatisfaction with the present order of things, so visible everywhere in Europe, is rapidly increasing in our country. These would not disturb my pleasant visions of the future greatness of our country, if such socialism, unrest and dissatisfaction with the present order of things rested upon a firm moral, or distinctively religious idea or basis, but since they rest on worldly, materialistic and socially considered, immoral ideas, to wit; upon the desire to get something for nothing; to have wealth and material comfort without working for them; the desire to gratify the passions and evil propensities without restraint; every government, ours as every other, should possess a small but perfectly reliable army to sustain law and order, especially against mobs led by demagogues, which are sure

to breed more trouble in the future than they have in the past. The huge armies on the European continent are an imminent danger to their respective countries, when one considers prospective risings of Socialists, Anarchists and other dissatisfied classes, to overturn suddenly their present form of government. The partially trained youths who compose the mass of their armies are very liable "to go with the crowd." *As every government which is now liable to these dangers is a liberal government, in which the people are now the real basis of the government, who, if suffering from any real ills, have the legal means of regulating them,* there can be no proper excuse for the mob action now greatly apprehended. I am satisfied that any of such people (our own people especially), if given time for a sober second thought, will support the Government against any such hasty revolution. Any large force of "National Guards" (as the uniformed forces of the States is usually called), would be the same menace to our general government or to the State governments as the huge armies of semi-disciplined soldiers kept under arms in Europe are to their government. Therefore I conclude our general government has but to add instruction by means above given to our people in the use of modern weapons, fortify our harbors, build a defensive navy, keep up a small perfect regular army of reliable men—over 21 years of age—encouraging reënlistments; these, with a small National Guard in each State, would complete our organization for defense against a foreign foe, and insure good order and stability at home.

THE NEW INFANTRY RIFLE.

By Captain C. J. CRANE, 24th U. S. Infantry.

IN the JOURNAL OF THE MILITARY SERVICE INSTITUTION for January, 1893, appeared an excellent article on "Musketry Training," written by Capt. James Parker, 4th Cavalry. The value and importance of musketry training, or target practice, was fully shown by him; it was made very evident that from our very beginning on this continent we have been greatly indebted for our successes in war to the superior marksmanship of the American soldier.

Capt. Parker's essay was apparently called forth by the dissatisfaction manifested by some of us with regard to the great amount of time, labor, and attention devoted by us to small-arms target practice. That article seemed to me to be strong enough to settle all question as to the great importance of fine marksmanship in our army; in my own mind there had been no doubt on the subject.

But those who do not lay great stress upon the importance of marksmanship in our army have apparently gained their point with the adoption of our new rifle; and if that weapon is to be retained in its present shape it might not be far amiss for us to devote no more time to instruction in individual practice at known ranges, and instead, learn "at the word of command (to) turn a stream of bullets in a horizontal direction normal to the front."

This method is a little out of date, but what of a rifle which must not be aimed at the object which one desires to hit?

Such a weapon can hardly be the result wished for by those who have been advocating the adoption of a "military rifle," as though we had none in the old Springfield, but that the description is true requires no more proof than one season's target practice with the Krag-Jorgenson gun. The smaller and lighter bullet is more at the mercy of every breeze than was the bullet of our old Springfield rifle, yet it has not seemed proper for a military rifle to approach the attainment of accuracy by such means as a wind gauge or movable rear sight, and therefore we

do our best guessing and "wish it well" when we shoot with the new infantry rifle.

The drift of the bullet has an automatic correction on the rear sight for only two ranges, 500 and 1000 yards; therefore for all other ranges we guess our best, whether or not we are supplied with a little air in motion to increase our difficulties. This automatic correction for drift is effected by placing the rear sight notch, slightly to the left of the axis of the bore.

There are two such notches, one used with rear sight laid down or inclined, the other is used with that sight upright. For the first mentioned notch; "placed to the left of the axis of the barrel it corrects for the drift at a single distance; 500 yards has been selected; for 300 and 400 yards the drift correction is then slightly in excess of the true amount; for 600 yards it is slightly too small."

And the rear sight notch used with leaf upright; "placed to the left of the axis of the bore it corrects for the drift at 1000 yards; for distances less than 1000 yards it gives a correction slightly in excess of the true; for distances over 1000 yards a correction less than the true amount."

That is; for distances at which we use the rear sight laid down or inclined, the path of the bullet is to left of the line of sight till 500 yards is reached and there the bullet crosses over and proceeds on its way to the right. Then when the distance is increased to 700 yards and we have to raise upright the leaf of the rear sight, we have a new notch which is further to the left of the axis of the bore, and the bullet again travels to the left of the line of sight till we fire at 1000 yards when it again crosses the line of sight and ever after is to be found to the right of that line.

We used to hear, now and then, that the old Buffington rear sight was too complicated and hard to use, being beyond the intellect of too many men.

It is to be hoped that the advocates of a "military rifle," not a target rifle as the old Springfield was sometimes called, are satisfied with the new rear sight and that they find no difficulty in easily instructing their men how to use it properly; moreover that they will inform the rest of us how such instruction can be given satisfactorily. This article is written in the firm belief, the result of a season's target practice and some shooting at game, by my company and by myself, that the automatic corrections for

the drift of the bullet at only two distances, 500 yards and 1000 yards, merely complicate matters, and that to have no drift correction at all would be preferable to such condition.

We would then know that, leaving wind out of the question, with each increase of distance the bullet would move farther and farther to the right of the line of sight, and we would therefore aim more and more to the left of the object, just as is done in the use of some other rifles having the right handed twist of groove.

Perhaps an automatic correction for the drift at all ranges would necessitate the adoption of a rear sight somewhat like the old Buffington sight that we know so well. The advantage of such change from the present rear sight would be that with no wind, at all ranges we would aim, not to the right till the object is 500 yards away, then to the left till we raise rear sight leaf upright, then again to the right till the object reaches the distance of 1000 yards, and after that to the left, aiming *at* the object we wish to hit at only 500 and 1000 yards; instead of all that complication of sights and sighting we would at all distances aim and look steadily at the object just as we used to do with our discarded rifle and rear sight.

But with our former rifle and rear sight we used to hit the *target*, as well as big game at unmeasured distances; by the selection of our present rifle and rear sight we are told that such reliability does not become a properly constituted military rifle.

And suppose the rear sight to be movable to the right and left, allowing correction for wind! We have heard that battles are sometimes fought in high winds and under circumstances generally which would puzzle the most expert shot to keep his rear sight properly adjusted.

But would such expert be less puzzled to properly handle the sights of the present weapon knowing that from 100 yards back to the limit of vision he would have only two distances at which he could aim directly at the object with any hope of hitting it? If the questions of automatic drift correction for all ranges and of movable rear sight, had been submitted to the consideration of those who have in hand the proper instruction and handling of the men who are to use our small arms, the smallest sort of minority would have pronounced against the advantages of the old sights, especially if given the slightest hint of the present sights as the alternative.

Our good shots understood the Buffington sight and gladly availed themselves of its advantages; our poor shots are not improved by the change.

Is accurate shooting a thing to be shunned in a military rifle? It is said that King George's hired Hessians laughed at the rifles of their opponents, requiring as they did so much time in loading and firing. But the rifles of our forefathers were so accurate and true shooting, and the men who held them were so skillful in their use, that few of those Hessians returned to Europe to tell the story of our independence.

Suppose Andrew Jackson had before the battle of New Orleans exchanged the small-arms of his little army for those of Packenham's English. The assault on Jackson's works, so early in the morning, would have succeeded beyond a doubt, for nothing but the marvellous marksmanship of Jackson's riflemen enabled them to beat back the steadiest infantry of that time. Until recent times infantry fighting was done at what we now call short ranges, very short. Yet, accurate shooting, or good marksmanship, was then of the greatest importance, as the whole history of our people reminds us. If such marksmanship in the infantry soldier was formerly of such advantage, at such short ranges, is it possible that its importance has been diminished in our time at ranges relatively as short, and against enemies more than ever before concealed from sight in their skirmish lines lying down behind cover?

Accuracy in a rifle is now just as important as ever in the history of fire-arms, and it is needed at greater distances than ever before. We need now to be able to hit an object at distances which were entirely beyond hope with former marksmen.

European nations know that as a people we are the best shots in the world, and those not friendly to us must be pleased to see us deliberately lay aside the only aid which might in the beginning make our volunteers and regulars capable of opposing the steady discipline of their soldiers with any hope of success at all.

To return to our subject; leaving wind and drift out of the question last season's target firing showed us that 500 yards was the only range at which our new rifle gave anything approaching satisfaction when fired with indicated elevations at corresponding distances from the target. At 200 yards our average aim was at a point on line joining centre of target and lower right hand corner, and at least 15 inches from edge of bull's-eye.

At 300 yards the majority had to use the lower edge of the 400 yards shoulder on rear sight, and aim at right hand edge of target at height of bull's-eye.

At 600 yards best results were obtained with rear sight slide at upper edge of 500 yards shoulder. The wind on our range came from the right, necessitating of course more than proper amount of correction for the faulty position of the rear sight notch. It seems that when we went abroad for our military rifle we also accepted without question the less finished style of sights used over there. Indeed, we have gone backward in the matter of rear sights, and generally, of complete finish to our small arm.

Twenty years ago in the Winchester rifle the important breech mechanism had an open exposure to wind, sand and water. Our new rifle is afflicted in the same manner. At present the Winchester small arm has a slide top piece which protects from the elements the mechanism which was formerly exposed.

That our weapon should also have a slide top to protect from the weather all that important breech mechanism seems beyond question, and the experience of a two weeks' practice march in October makes me absolutely sure of it.

On that march I frequently examined the new rifle, always noticing the open exposure and everything about the chamber.

I found no rifle which was not in working order, but the three old Springfields with the company were always in better condition.

In a number of instances I saw pieces of rags wrapped around the gun at the chamber, making the piece unserviceable for quick use, but assisting the manufacturer to keep the chamber in such condition that the rifle could be used at all.

It is hardly natural to suppose that the breech mechanism of our new rifle will work, unprotected from exposure, just as well as though furnished with a slide top which would give protection when the chamber is closed like that of the Winchester rifle.

Let us not be too long learning the lesson of that weapon.

Now that the back position is practically a thing of the past, there can be no good reason for our not using the pistol grip. It certainly enables one to hold the piece more steadily whenever pressed against the shoulder, and its advantages are manifestly appreciated by the great majority of gunmakers all over our country. We had pistol grips once, but for some reason un-

known to me we were not allowed to use them on the target range.

The butt plate of the new rifle is about straight, being the first gun I ever saw with that shape. The conformation of a man's shoulder where the butt plate rests is such as to demand that the hard smooth surface pressing against his flesh and bone should be curved so as to bear about equally along the whole length of the butt plate. Of course we now have no question of injury from recoil when shooting, but with curved butt plate the piece can undoubtedly be held against the shoulder more firmly, easily, and naturally.

I have heard of only one man who prefers the straight butt plate; the same man is the only one I ever saw who uses the body rest in shooting at game.

Being accustomed to instructing our men to hold the Springfield rifle so that the whole butt plate should fit against the shoulder, and not merely touch one point of it, we are slow to understand what reason or cause induced the change to a straight butt plate.

I am not perfectly satisfied with the small calibre of our rifle.

I cannot enter fully into the generous spirit which seems to prompt the reduction of calibre among the civilized nations of the world, being unable to understand what should be our object in shooting at our enemies if not to kill them, and having little faith in the plan of disabling several enemies by wounding one of them.

We have very conflicting reports on the effects of the small calibre rifle.

Some reports tell of the dreadful effect of the small bullet, while others apparently just as reliable, inform us how Chinamen and natives of the Himalayas seemed to suffer no great inconvenience from gunshot wounds that should have been mortal.

I am acquainted with a hunter on the Gila River who killed five bears last season with a calibre 38 rifle, but his weapon was accurate and in order to reach the heart of his victim at 160 or 175 yards he was not compelled to aim at the animal's left hind foot.

In an army the main thing would seem to be to give the soldier confidence in his weapon. Our men had confidence in the Springfield rifle, and they have very little in the Krag-Jorgenson. With the old rifle they knew that holding the piece steadily they

could generally hit very close to the mark; with the new rifle they are discouraged by the knowledge that they must not aim at the object if they wish to hit it. On our recent practice march while out hunting one day in the mountains I met two men of my company; one carried a Springfield rifle and was simply accompanied by the other man who had only a pistol.

Our new rifle has serious defects, but if no one tells what they are what hope can there be of getting them remedied? We have the uncovered chamber and the unprotected breech mechanism; the rear sight has automatic drift correction for firing at only two distances, which is worse than no drift correction at all; the rear sight admits of no movement laterally, and the indicated elevations afford most unsatisfactory data for firing at any corresponding distance except 500 yards and perhaps 1000 yards.

Where the wind neutralizes the drift, and the right elevations are found, fine shooting can be done with the new infantry rifle. But the weather cannot be depended upon to furnish us with the correct wind at all times, and we cannot always guess the best elevation to use for a distance suddenly given.

To make a rifle now with straight butt plate and without pistol grip is to ignore all lessons of experience.

With regard to actual results on the target range the following data from my company records are herewith submitted.

In 1894 with the Springfield rifle the company's average per cent. of scores at 200 yards was 67.8, at 300 yards 62.5, at 500 yards 62.2, and at 600 yards 50.8.

In last season's firing, with the new rifle, we made at 200 yards 61.3, at 300 yards 56.2, at 500 yards 55.9, and at 600 yards 40.9 per cent.

The results given are not exactly just in a comparison of accuracy between the two rifles, for in 1894 more preliminary and additional firing was given.

That it was possible for us to do even as well as we did under all the circumstances speaks well for the straight shooting of the new rifle when not affected by the wind and when the drift correction can be correctly guessed.

But the wind will insist on blowing, and the bullet persists in going off to the right, and the result is that the infantry are not satisfied with their new weapon, having very little faith in its accuracy, and this lack of confidence in such an important part of the rifle's power coupled with more than half a fear that the cali-

bre has been reduced too much, would seriously impair our usefulness in the first campaign.

Still, I believe that if we are given accurate sights, having drift correction for all distances and allowing correction for wind too, and if provided with the other named advantages, we would march with confidence to the battle-field. Nothing affects the spirits of the individual soldier more than to know that he can depend on his rifle, unless it is the knowledge that his weapon is very inferior in stopping power.

Reprints and Translations.

REVIEW OF MILITARY TECHNOLOGY FOR THE QUARTER ENDING JUNE 30, 1896.

(*From the Jahrbücher für die Deutsche Armee und Marine.*)

Translated by CAPT. T. A. BINGHAM, CORPS OF ENGINEERS, U. S. A.

ARMOR—GERMANY.

THE experiments made by the German navy with armor plates have been described in a recent publication, *Marine Rundschau* of E. S. Mittler & Son, Berlin.

In December, 1894, experimental firing was done against Krupp's hardened steel plates made of nickel ingot-iron. The plates were 14.6 cm. thick and bolted to a 60 cm. wooden backing. Results were

15 cm. cannon L/30—living force of 21.08 m.t. per cm. of circ.—plate penetrated.
15 cm. " L/35—living " " " " " " " —plate penetrated and backing injured.
21 cm. " L/22—living force of 18.2 m.t. per cm. of circ.—plate penetrated.

In March, 1895, experimental firing was done against Krupp's hardened steel plates of a new kind, 30 cm. thick and fastened to a wooden backing 1 metre thick. The guns used were

21 cm. cannon L/30—living force 50.06 m.t. per cm. of circ.—
28 cm. " L/22
30.5 cm. " L/35—living force 63.43 m.t. per cm. of circ.—
(Plate not penetrated by any of the projectiles.)

The above 21 cm. cannon, with the living force of projectile above given, would have penetrated an ordinary steel plate 48 cm. thick; and the 30.5 cm. projectile, with living force as above given, would have penetrated an ordinary steel plate of 50 cm.

An article by J. Castner in *Steel and Iron* (*Stahl und Eisen*) of Sept. 1 and 15, 1895, says that the Krupp 30 cm. plate is very much superior to the extraordinarily good American 14″ plate (35.5 cm.) from the Carnegie Works. The American plate was forged into shape before hardening but after carburization; and was penetrated by a Wheeler-Sterling projectile, with an impact force of 6289 m.t.; the backing of 35.5 cm. of wood and

3.65 cm. of sand being also penetrated. The above mentioned 14.6 cm. Krupp plate had a superiority of 84% over an ordinary unhardened steel plate, and corresponded in resistance to 37.8 cm. of good wrought iron. Hence it displayed hardness and toughness, those generally directly opposite qualities, in a degree not formerly attained.

According to Castner, those plates which are surface hardened must get their final shape before the hardening is imparted; and it is not always possible to avoid unforeseen changes of form during the final hardening. When, therefore, great exactness of shape is required, plates without surface hardening must be used and the necessary resistance attained by metallurgical methods.

At a competitive trial at Texel in August, 1893, such a (surface-hardened) plate, of nickel steel and 15 cm. thick was penetrated by a 12 cm. shell having 500 m. of impact velocity; while the St. Chamond plate required 573 m. of impact velocity for its penetration.

Material advances have been made in the production of such (unsurface-hardened) soft nickel-steel plates by cooling them, not in water but in oil.

On the 14th July and 15th December, 1894, at Meppen, such a (surface) unhardened plate, 15.5 cm. thick, was battered by

(*a*) 12 cm. cannon L/35 with steel armor piercing shell of 26 kg. The shell was broken into many pieces.

(*b*) 15 cm. cannon L/30 with steel armor piercing shell weighing 57 kg. The shell had an impact force of 646.7 m.t., penetrated the plate and remained stuck in the backing. It would have penetrated 30.2 cm. of iron and 21.7 cm. of ordinary steel armor. These shells were not broken but shortened by 20.5 mm.

(*c*) 17 cm. cannon L/40 with steel armor piercing projectiles of 77 kg. These shells struck the target with a force of 722.3 m. tons (or 3.087 metre tons per square cm. of cross section), penetrated it completely, went 9 metres further and penetrated 1 metre into earth.

At the end of the 10th shot this plate had received a total impact of 5109.9 metre tons without sign of a crack. According to Castner, in the case of (surface) unhardened nickel armor an increase of resistance produced by increased hardening (throughout), is accompanied by a corresponding increase in toughness.

Further experiments with Krupp's tempered nickel steel plates took place October 16, 17 and 19, 1895, at Meppen (*Marine Rundschau* for March, 1896). The plates were 8 cm. and 10 cm. thick. Of the first thickness there were two plates, No. 476 A and 476 B, each 1.5 m. by 1.14 m. Of the greater thickness there was one plate 2.5 m. by 1.5 m. All the plates had a backing of 30 cm. of oak and 4 cm. of wrought iron. The thinner plates were fastened by 4 nickel steel bolts 5.5 cm. in diameter, the thicker by 8 such bolts.

During Series 2 and 3 of the shots, the plates were, for some shots, set up by themselves, at a distance of 1 metre in front of an oak wall. The results given below are incomplete. Where no angle of impact is noted it was 87°. All projectiles were broken up.

SERIES I—AGAINST 8 CM. PLATE NO. 476 A.

No. of Shot.	Cannon.	Projectile. Kind.	Weight. kg.	Impact Velocity. m.	Living force. Total m. t.	Per cm of circum. m. t.	Per sq. cm of cross section. m. t.	Effect on Plate.
1	8.8 cm. Quick-Fire L/24.	Steel Shell L/2.6	7.0	452.2	72.96	2.639	1.200	Almost none.
2	"	"	7.0	585.0	122.1	4.419	2.008	Front, 10 mm indent; back, 5 mm. bulge.
3	"	"	7.0	608.7	132.2	4.782	2.173	Front, 18 mm. indent; back, 13 mm. bulge.
4	10.5 cm. Cannon, L/35	Steel Shell L/3.1	16	419.6	143.6	4.353	1.658	Piece punched through into backing.

Hence, the plate showed itself fully strong against the 8.8 cm. gun; and, with its backing, against the 10.5 cm. gun.

SERIES II.—AGAINST 8 CM. PLATE NO. 476, B.

No. of Shot.	Cannon.	Projectile. Kind.	Weight. kg.	Impact Velocity. m.	Living force. Total. m. t.	Per cm. of circum. m. t.	Per sq. cm. of cross section. m. t.	Angle of Impact deg	Position of plate.	Effect on Plate.
1	8.8 cm Quick fire L/24.	Steel shell L/2.6.	7.0	453.7	73.44	2.657	1.208	87	Bolted.	Front, 5mm indent Back, no effect.
2	"	"	7.0	606.8	131.4	4.752	2.160	87	Bolted.	Head of projectile stuck in shot hole. Back, 13 mm. bulge.
3	10.5 cm. cannon L/35.	Steel shell L/3.1	16.0	430.4	151.1	4.580	1.745	87	Bolted.	Back, 30 mm. bulge —crack.
4	"	"	"	464.1	175.6	5.325	2.028	"	Bolted.	Front, 35 mm. indent. Back, 22 mm. bulge.
6	"	"	"	516.3	217.4	6.590	2.510	48	Standing free.	Front, 10 mm. indent. Back, 5 mm. bulge.
8	"	"	"	565.8	261.1	7.914	3.015	"	Standing free.	Plate penetrated. Piece of projectile 15 cm. in rear oak wall.
9	"	"	"	541.1	238.8	7.238	2.757	"	Standing free.	Pieces broken off front side of plate Rear part of plate 60 mm. bulge.
5	15 cm. Cannon L/30 or L/35.	Steel shell L/2.8.	40.	456.5	336.9	7.192	1.929	87	Bolted.	Everything penetrated.

The 8.8 cm. cannon was stopped by this plate, as was also the 10.5 cm. cannon with low velocities, as long as the plate was bolted to its backing. But this plate when standing free in front of its backing was penetrated twice with greater velocities and under angle of impact of 48°.

Series III. was against the 10 cm. plate. The 8.8 cm. gun was resisted successfully by this plate, which was penetrated, however, by the 10.5 cm. gun but only when standing free of its backing, with impact velocities of 670 m. and 630 m. and at the last two shots; and the plate had also then previously been fired at by the 12 cm. and 15 cm. guns, the latter of which had fired service shells. Shots 9 to 11, both inclusive, were with service shells

and the report says, in each case, that the projectile either broke up or burst prematurely. There is nothing in the report, however, about the proportions of the bursting charge. These shells must have been of chilled cast iron, certainly not of steel for that fact is always noted in the table.

If the bursting charge had exploded it would certainly have been observed.

SERIES III.—AGAINST 10 CM. PLATE.

No. of Shot.	Cannon.	Projectile. Kind.	Weight. kg.	Velocity of Impact. m.	Living Force. Total m. t.	per cm of cir um. m. t.	per sq. cm. of cross section m. t.	Position of Plate.	Effect on Plate.
1	8.8 cm Quick-fire L/24.	Steel Shell. L/2 6.	7.0	528.4	99.61	3.603	1 638	Bolted.	15 mm. indent. No effect on back.
2	10. 5 cm. L/35.	Steel Shell L/3.1	16 0	393.1	126.00	3.820	1.455		5 mm. indent. slight crack. No effect on back
3	"	"	"	484.8	191 7	5.81	2.213		9 mm. indent. slight crack. Back, 5 mm. bulge.
4	"	"	"	620 1	313.6	9.506	3 621		81 mm indent. Back, 45 mm. bulge, slight crack.
8	"	"	"	608.6	302.1	9 157	3.488	Standing free.	75 mm indent. pieces of shell thrown backwards. Piece of plate broken off and forced to the rear. 35 mm. bulge on back, cracked.
12	"	"	"	663.9	366.0	11.09	4.226		Plate penetrated. Rear wall penetrated and its rear iron skin bulged 60 mm.
13	"	"	"	630.1	323 8	9.815	3.739		Piece of plate knocked back 100 mm. into timber rear wall.
6	12 cm L/30.	Steel Shell L/3.5	26	500.7	332 2	8.813	2.938	Bolted.	Indent. head of shell welded in front side 35 mm. bulge at back. Cracked.
5	15 cm.	Steel Shell L/2.8.	40	406.5	336 9	7.192	1.929		20 mm indent. bulge of 18 mm in back. Head of projectile mushroomed. Outside shell of projectile in large pieces.
7	"	Steel Shell L/3.4.	51	409.0	434.8	9.283	2 49		Plate penetrated and piece knocked back 150 mm. deep into back wall
9	"	Service Shell. L/3.7.	45 5	642.4	957 0	20.43	5.481	Standing free.	Hole knocked through plate. Pieces of shell got through target and pieces of plate through rear oak wall. Rear iron skin of oak wall bulged 80 mm.
10	"	"	"	523.6	635.8	13 57	3.641		Indent of 20 mm. Plate much bent, concentric cracks around hole. 15 mm. bulge in back.
11	"	"	"	574.2	746.6	16.32	4.379		Hole knocked through plate and the pieces just behind. Pieces of shell thrown backward.

On the whole, the beneficial effect of the tempering is proved by these experiments; for no projectile failed to be shattered. The plates are quite satisfactory for armored cruisers.

The April (1896) number of the *Marine Rundschau* gives details of

firing at hardened 15 cm. steel plates from the Dillingen works at Saarlouis. Firing was done April 19, 1895, on the firing grounds at Meppen. The plates were made according to Krupp's process.

These experiments were analogous to those of Dec., 1894, against Krupp 14.6 cm. plates. Shot No. 1 was fired at Dillingen. At Meppen the plate was bolted to 60 cm. of iron-wood with a further skin of 40 mm. (iron?) and there was also a wrought iron erection in rear of this. The plate compared well with Krupp's.

ARMOR PLATE EXPERIMENTS AT DILLINGEN (SAARLOUIS), APRIL, 1895.

No. of Shot.	Cannon.	Projectile. Kind.	Projectile. Weight. kg.	Velocity of Impact. m.	Living Force. Total. m. t.	Per cm. of circum. m. t.	per sq. c.m of cross section. m. t.	Effect on Plate.
1	21 cm. L/22	Steel shell. L/2.5	96	467.2	1068	16.24	3.104	Indent of 57 mm. Bulge at back 30 mm.
4	"	"	.2	504.0	1232	18.73	3.581	Piece of plate almost knocked through but holding at back.
2	15 cm L/30 and L/34	Steel shell. L/3.4	51	478.8	595.9	12.72	3.413	Indent 17 mm. Bulge at back 10 mm.
3	"	"	"	579.3	872.3	18.62	4.996	Indent 25 mm. Bulge at back 45 mm
5	"	"	"	607.0	957.8	20.45	5.485	Dent 30 mm. Crack. Bulge at back of 45 mm. Plate sagged horizontally and vertically a supporting timber being 30 mm. bent.

FIELD ARTILLERY.

Austria.—Colonel von Wuich, in a recent article entitled "Development and Equipment of Artillery," says that, as soon as any neighboring army shall have definitely adopted new and more effective guns, Austria will be at once compelled to follow this example. Now, it is odd that although opinion is strong (and that too in Austria) that the day of bronze cannon is past and that future guns should be of steel, which domestic manufactories are fully competent to produce, Col. von Wuich should have stated that bronze has been produced in the Austrian arsenal, in no way inferior to steel! (*Armee Blatt, No.* 9.)

The *Revue de l'Armée Belge* (Jan.-Feb., 1896) contains a summary of the heavy batteries of the Austrian field army. They have 15 cm. mortars and 12 cm. cannon. The latter seem likely to be replaced by the 10.5 cm. guns now under experiment. The 12 cm. gun is used for long distances where the mortar does not reach. Five battery groups have been organized, each consisting of two mortar and one cannon battery—each battery of 4 pieces. At present, experiments are also being made with light 21 cm. mortars with torpedo shells, L/4 and L/5. A 15 cm. howitzer has also been introduced.

Russia.—Instead of adopting a new field-gun, the former light field-gun will be retained with calibre of 8.7 cm. and projectile weight of 6.9 kg. But

the projectile velocity will be increased, effect of shrapnel made more effective, rapidity of fire accelerated to 4½ shots per minute and ammunition supply enlarged by increasing the contents of the wagons by 50%.

Rapidity of fire is to be accelerated by aiming the gun while it is being loaded and this necessitates putting the sights on one side and farther to the front. The new order was issued August 15, 1895, for the light field and horse artillery provided with screw breech-blocks.

The gun has a jacket reaching as far as the muzzle and surrounding the inner core. In front of the trunnion ring is what may be called a third and fastening ring which prevents jumping of the gun.

The front end of this latter ring is about two-thirds of the gun length from the muzzle. Just in front of this ring is a band encircling the gun which carries a side bracket on which the front sight, called System Broca is placed. This sight is adapted for use backwards, in covered positions; but can be used for forward sighting.

Midway between trunnions and breech is screwed a side bracket which carries the rear sight cylinder. The rear sight itself is provided with gearing and a spiral spring, is of a completely new construction and is very easily set. (*Revue d'Artillerie*, April.)

The *Revue d'Artillerie* for March, 1896, has further details of the breech mechanism of the field-gun, from Col. Budajewski's artillery handbook. The screw has three smooth cuts and three others provided with screw threads, a crank with safety device, a fixed hand-grip, a buffer device with axial vent, the plastic gas ring (100 parts asbestos, 58 parts tallow) and finally a breech door. It does not differ materially from the French breech-block.

France.—According to the *Progrès Militaire* of March 14, 1896, the War Minister, G. Cavaignac (since out of office), was present on March 11, in Bourges, at the final tests of new models of guns and projectiles, which had already been tested at Calais and Châlons. He was accompanied by Gen. Deloye, Director of Artillery in the War Ministry, and by the general commanding at Bourges, the well-known powder inventor, Brugère. The guns tried were the future quick-fire cannons for the field artillery and as Bourges is the seat of the pyrotechnic school, the trials were mainly with ammunition. It is however almost certain that no manufacture on a large scale will be begun just at present.

Switzerland.—Experiments have been made during the past year with field and mountain guns. In future only shrapnel will be used with these guns.

The position artillery has, for the 12 cm. cannon, two-thirds shells and one-third shrapnel; for the mortars half and half. The shrapnel will, in future, have fast screwed fuse-gauge plates. While high explosive shells are not exactly adopted, still a part of the 12 cm. shells of the position artillery will have bursting charges of white powder. (*Zeitsch. für Art. u. Gen.*)

Colonel Orelli, head of the technical section of the ordnance department, in a lecture before the officers stationed at Berne, on Jan. 29, 1896, said the present systems of quick fire field-guns were not yet fully satisfac-

tory, but that, on the other hand, excessive demands were made in requirements for such guns. Also that Switzerland would do well to strive for better military and tactical instruction of the troops and their officers for the purpose of increasing the efficiency of its army, rather than to be too eager for merely technical progress.

The Swiss experimental artillery station has published in the *Schweiz. Zeitsch. für Artill. u. Genie* results of firing with 12 cm. long steel shells with bursting charges of white powder—belonging to the class of high-explosive shells.

The size of bursting charge had heretofore been regulated by the requirement that, in the 12 cm. nickel steel gun, even if the projectile burst in the gun it should be without danger to the gun crew, the gun being strong enough to prevent such danger. Hence, it was not possible to have the bursting chamber very large. Since, however, in mortars, the low charges make premature bursts impossible, it became desirable to see if steel shells with a comparatively large high explosive bursting charge could not be used with advantage. A number of long thin-walled steel shells were obtained from Bofors (Sweden), loaded with an improved white powder bursting charge and fired:

(a) Partly from 12 cm. mortars of the position artillery at 2000 m. range against a cliff.

(b) Partly from 12 cm. mortars of the armored fortress artillery at 2200 to 2700 metres range into the open.

This Bofors 12 cm. steel shell is 3.7 cal. long, weighs empty 15.675 kg., has a bursting charge of 1.72 kg. of white powder P. C. 88, a fuse charge of 28 g., a lip, for pouring paraffine, weighing 250 g., and weighs when ready for firing 17.93 kg. It has a percussion fuse.

The position artillery mortar is loaded with 100 grains of white powder; the fortress artillery mortar has various charges up to 100 g.

It was found by the experiments that the long steel shells fired from the position artillery mortar gave much greater craters than the short iron and steel shells of the 12 cm. cannon, although the latter gave much greater final velocities.

The long steel shells fired from the fortress mortar threw out twice as much earth as the short iron and steel ones, These short shells had a bursting charge of 0.75 kg.

Moreover the craters from the long shells were much more clearly defined and the earth better and farther thrown out than with the short shells, a matter of considerable importance in bombardment of earthworks.

The long shells were also satisfactory as regards smoke; and they are to be further experimented with.

The Swiss position artillery consists of five divisions, each having

Field Army.		*Reserve.*	
14	12 cm. cannon	28	12 cm. cannon
10	12 cm. mortars	20	12 cm. mortars
16	8.4 cm. cannon	16	8.4 cm. cannon

It will be used in improvised earthworks, passes, positions taken up,

railroad junctions and reserve depots; also to support permanent forts when they are attacked.

Denmark.—According to *Löbell's Jahresberichte*, 1895, which draws from direct sources, this country has in view for the 8.7 cm. field-gun L/24, Mod. 76, a new steel shrapnel having a base chamber, 300 hard lead balls of 11 g. weight, 70 g. bursting charge and a double fuse of 24.8 sec. extreme burning time.

For fortress artillery a 7.5 cm. quick-fire gun on field carriage with shield has been adopted for migratory use. A 12 cm. field howitzer is included in the equipment.

The coast artillery includes

30.5 cm. cannon L/40; 12 cm. quick fire L/40; 37 mm. quick fire;
17 cm. L/40; 7.5 cm. quick fire for migratory use.

High explosive armor piercing shells of different calibres have been adopted.

Experiments are in progress with sea-coast howitzers.

Sweden.—The field artillery is being provided with aiming instruments (diopters). The army and navy are to be represented by special displays at the Arts and Industries Exposition to be held at Stockholm in 1897. Ten new field batteries were decided on in 1892. 8 will be ready in 1896, the rest in 1897.

Japan.—During the recent war Japan had mountain guns of 4 kg. projectile weight, of an old French model and also some guns of the Mondwell system. The mountain guns did good service at Port Arthur and on other occasions.

QUICK-FIRE GUNS.

Austria.—The Technical Military Committee have published a study by Captain Weigner on the question of future field-guns in which he claims that, in order to give an intense fire at decisive moments, a quick-fire gun is necessary; and that it should be in the power of the officer directing the fire to produce a greater or less intensity as circumstances require. In common with other professionals he gives about 8 cm. as the most suitable calibre for the future field-gun.

England.—Armstrong of Elswick has produced a 20.3 cm. quick-fire cannon which has given good results in experiment. It can be served by hand or by electricity and is capable of 4 shots per minute. This is the largest gun of its kind, his former 15.2 cm. being, when built, also the largest at the time. Metallic cartridges for even greater calibres have long since been manufactured in Germany.

The growing importance of quick-fire guns has determined that all 15 cm. guns shall in future be so constructed; and the former 10.2 cm., 12.7 cm. and 15.2 cm. are to be altered into quick-firers.

The electric carriages for guns as large as the 24.5 cm. on the *Barfleur* have given good results and the principle is to be more widely applied.

Switzerland.—Experiments have been made (during 1895) with 7.5 cm. field and mountain cannon, made at St. Chamond on Darmancier's quick-fire system. With the heavy type of field-gun the projectile velocity V 40

(=at 40 m. from muzzle) was 574.3 m. with a mean gas pressure of 2059 atmospheres.

With service shells, the mean longitudinal deviation at 1500 m. was 10.9 m.; at 2469 m. was 30.9 m.

With the mountain gun having a V 25 of 327 m. (=at 25 metres from muzzle) the mean gas pressure was 1015 atmospheres. The mean longitudinal deviation at 1482 metres range was 28.2 m.; for range of 2530 m. was 25.9 m.

The shells of the field-gun, ready for firing, weighed 6.45 kg.; bursting charge, 202 g. of black powder; powder charge of Fa, St. Chamond, weighed 1.125 kg.; detonating charge of 5 g. black powder in a combustible bag.

The shells of the mountain gun weighed 5.25 kg.; bursting charge, 190 g. of black powder; powder charge of gun 0.26 kg. of same powder as mentioned above in a combustible paper bag.

Experiments were also made with a 3.7 cm. automatic Maxim gun from the firm of Maxim-Nordenfeldt. The shells were of various types, weighed 460 g., were propelled by a gun charge of 32 g. of cordite and gave 482.5 m. velocity. Rapidity of fire was on an average 3.2 shots per second. Accuracy was satisfactory.

Belgium has adopted a non recoil carriage for the 5.7 cm. quick-fire gun. This arm is to be used in front of and between the detached forts and to stand very high. The type is Cockerill-Nordenfeldt, hydraulic brake, fine traversing gear, driving brake and steel shield, 92 carriages (out of a total of 290) have been ordered from Seraing. Nordenfeldt of London and Skoda of Pilsen also competed.

SEA-COAST CANNON.

England.—The Secretary of State for the Navy, in his report on the budget of 1895, reports that experiments with the 30.5 cm. (12″) wire wound gun have given splendid results. It is longer than the ordinary gun of the same calibre, yet 20 tons lighter (47 tons as against 67 tons); and is in every way superior and handier. Special devices give easy handling and quick loading. The breech mechanism opens automatically after firing. One shot can be fired in a minute and a half.

In order to run the 30.5 cm. (12″) gun into battery, after firing, powerful springs have heretofore been used, but as many of these broke, Armstrong has devised a method in which the energy absorbed by the hydraulic brakes is utilized and the ammunition for the following shot is brought by lifts into the middle of the barbette turrets. Experiments are said to have been favorable. The time for one shot has been reduced to 1 minute and 20 seconds.

Norway has ordered from Whitworth & Co., of Manchester, a 28 cm. coast howitzer intended for the defense of the Strait of Oscarsborg. It is made of steel, pressed while still in fluid state, has a renewable inner lining and weighs 11.75 t., fires a projectile of 345 kg., with a charge of 26 kg. of brown powder, giving a velocity of 275 metres. It was experimentally fired at Lydd in Kent. (*Rivista di artiglieria*, Jan., 1896.)

Sweden has ordered from the same firm a 24 cm. coast cannon weighing 30 tons, and 35 calibre long. The projectile weighs 215 kg., uses brown prismatic powder and has a velocity of 615 m. The twist is increasing. 118 kg. of powder gave a velocity of 615 m. with a gas pressure of 2100 atmospheres. 127 kg. of powder with a projectile of 220 kg. gave a velocity of over 700 m. and a gas pressure of 3000 atmospheres.

SMOKELESS POWDER.

England.—Cordite has finally been adopted for all quick-fire cannon and for the 23.4 cm. and 12″ cannon.

Roumania is building a factory for smokeless powder at Dudeschi, a few kilometres in rear of the line of forts at Bucharest.

FUSES.

England.—According to *Engineering*, No. 1513, a letter from Longridge confirms the fact that after a series of experiments at Portsmouth, the English Admiralty have decided on a new type of ordinary shell for the 5 ton to 110 ton guns (6″ and upwards). The shell will have base fuses and the point will remain a solid mass. The former arrangement was not favorable to penetration.

SMALL ARMS.

Austria.—Rudolf Berauck, Captain of Artillery, lectured before the Vienna Military Science Club on the light rifle for infantry, Mod. 1895, and the Extra Corps rifle, Mod. 1895. The following notes are from his remarks as published in *Armee Blatt*, No. 10, and the *Reichswehr*, No. 885. In deciding upon the new model, the military committee made exhaustive and long continued experiments at the Steyr factory upon the reduction of all dimensions. They succeeded, with domestic metal, in reducing the dimensions of the barrel to very small limits while maintaining its high degree of resistance. This result is also contributed to by the gunstock, which covers the entire barrel, preserves against bending from a blow or fall and does away with an extra so-called hand guard. The bayonet has also been made lighter and fastens deeper into the arm, not projecting so much as is ordinarily the case, and its edge is upwards when fixed.

The breech mechanism is that of the Mod. 1890 carbine, altered somewhat. While quite similar in working to that of the rifle, Mod. 1888, it has the following advantages:

Solidity and accuracy of fire are increased by two front lugs which make the fastening more symmetrical. The surfaces exposed to recoil pressure are larger, producing greater security against accidents resulting from bursting or tearing of the cartridge shell.

The practicable ventilating device makes it easier to extract a cartridge shell which sticks.

The breech-block has been shortened and the total length of the piece thereby reduced. The sight used for the new weapon is a sliding one with a movable bar, very easy to manipulate and fastened in each position.

The weights are as follows:

	New Model.	Mod. 88-90.
Rifle	3.63 to 3.78 kg.	4.49 to 4.66 kg.
Bayonet	0.28 kg.	0.38 kg.
" Scabbard	0.13 kg.	0.16 kg.

A clear and easy distinction is made between the lowest setting of the sight and the normal setting. The leaf is down for the former and up for the latter. This makes it possible better to control the change from normal to the lowest setting, which latter is used for short ranges and for aiming at heads—hence firing over is more likely to be avoided.

The barrel rests free in the shaft, being fastened only at the ends.

The new method of fixing on the bayonet has the following advantages:

(*a*) The edge of bayonet is not injured when firing lying down.

(*b*) The bayonet keeps the barrel off the ground when firing lying down,

(*c*) And hence keeps dirt out of the barrel.

The Extra Corps rifle has a still shorter barrel and weighs only 3.16 kg., or 550 g. less than the Infantry rifle.

Italy.—The troops of the first Italian expedition to Africa made the campaign with altered magazine guns, Mod. 70, 87 (Vetterli-Vitali). The small calibre rifles, Mod. 91, which had been issued to the Bersaglieri and Alpine troops were taken from them when they went to Africa. Later, however, 4000 of the small calibres were sent on to Africa and the troops there were armed with them (in all 12 battalions).

The new War Minister, Ricotti-Magnani, has now issued orders to the factories to supply 70,000 new small calibres as soon as possible. He wishes to arm the African troops with them without disturbing the armament of the home troops.

The saving in the budget which is to be obtained by various reforms will come handy in paying for this hastened fabrication of new rifles. The equipment of the first line of the army is to be completed by Jan. 1, 1897. The last two statements are claimed by the Italians but are open to doubt.

Sweden.—The 6.5 mm. Mauser rifle, Mod. 93, will, next year (1897), be manufactured at the rifle factory at Eskilstuna. 12,000 carbines are to be delivered in 1896 from Oberndorf and issued first to the cavalry and then to train troops.

Japan.—The *Revue d' Artillerie* of Jan. 1896, says the Japanese used the 11 mm. Murata rifles in their war. This is a single loader, adopted in 1880, manufactured in Osaka and Tokio, and issued 1884-89. The present Japanese rifle, an 8 mm. Murata repeater, Mod. 1887, was manufactured later, and had been issued to but very few troops when their late war broke out.

Mexico.—According to *El Combate*, repeated in *France Militaire*, of March 27, 1896, an experimental committee is studying a 5 mm. Mondragon rifle of 4.32 kg. weight, and a projectile velocity of *815 m/*

CHRONOGRAPH.

France.—La Nature gives details of a velocity measurer invented by (naval) Captain Thouvenin. It gives directly the speed of a moving object across a scaled distance, whether locomotive, foot passenger, horseman, bicyclist, or anything else.

DEPARTMENTAL BIMETALLISM.

By Brigade-Surgeon Lieutenant-Colonel WILLIAM HILL-CLIMO, M. D., Army Medical Staff (Retired).

(*From the United Service Magazine*)

IN my article headed "The Future of the Army Medical Staff," which appeared in the April number of this magazine, I invited attention to the persistence with which a large number of the Army Medical Staff urged their claims for military titles entirely dissociated from their profession, and to the support given to this demand by the chief medical journals of the day, threatening to boycott the service by preventing candidates from competing at the half-yearly entrance examinations until this demand was complied with. This threat has been now put into practice. The medical schools are now declining to send up candidates, and with the strength of medical officers below the fixed establishment, the present outlook is unsatisfactory. The time therefore has come to settle the question on its merits.

Perhaps if the granting of military titles would once and for all settle the question, and bring to a happy termination the military aspirations of the department, it might be as well to accede to the demand; but its history for the past five-and-twenty years forbids it, and gives no hope of finality. Each change which has taken place has been followed by fresh agitation—*Vires acquirit eundo*. Besides, the bestowal of military titles, pure and simple, on army medical officers, opens up the larger question of the use of these titles by all departments not entrusted with the command of troops in the field as a fighting unit. It embraces the whole range of military authority and command on which the fabric of army discipline rests. It is neither fair to the army, nor to the departments concerned, that there should be any hesitation—any leaving the question in a state of suspense. It produces a state of tension and of uncertainty which should be terminated at all costs.

There is not a week that passes but some medical paper of light and leading lends itself to the propagation of the new gospel, in which military titles by themselves are no longer sufficient, but that henceforth the Army Medical Staff must be given "a greater share in the work of the regular army." This is the ultimatum of the medical profession to the Secretary of State. Has it occurred to the advocates of this "Forward Policy," that if such work be entrusted to the Army Medical Staff, then its officers must be entitled to exercise command outside the sphere of their medical duties; in other words, that in so far as these new duties are concerned they must cease to be medical officers? There is no other solution, for responsibility and command are concurrent.

In the article just quoted I commented upon this development, and gave a historical summary of the conflicting circumstances to which it was owing. It will not therefore be necessary to go over old ground. "Let the dead bury their dead." The all-important question remains, what is to be done now? It is for the military and medical authorities to decide. Let their action be liberal, and let it be prompt; above all, let it be decisive. Half measures never suffice, and reform by driblets only invites at-

tack. Whatever may be done, it will not be necessary "to rob Peter to pay Paul." Hitherto, the question has never been approached in the spirit which commands a successful issue. To tide over a present difficulty, or to satisfy the exigencies of the moment, has been the end in view, leaving to-morrow to take care of itself. The blame for this hand-to-mouth policy is not entirely departmental, but must be shared in by the military authorities. How this has occurred will presently appear.

The heading of this article will suggest to the reader some of the points to which I wish to attract his attention, and the inferences which spring out of them. The department has been for years sailing under two flags, obtaining all the advantages of pay and pension, and of high rank also, which are rightly accorded to its profession, and now it demands that to these advantages there shall be added every right, every privilege, and every distinction belonging to the combatant officer; and these it demands, not because of its professional worth, but on account of its service relations, and of those quasi-military duties which the unification of the department has imposed upon it. The arguments advanced in support of these claims, if pushed home, will not, I fear, help them much. I propose detailing these arguments, and testing them to see how far they justify this position. Afterwards, I shall briefly consider the present grievances of the department which require to be redressed.

If reference be made to the medical journals which have espoused the cause of the Army Medical Staff, we shall obtain but little guidance. The statements made by anonymous correspondents in the service columns of these papers vary from week to week, while the editorial notes are equally shifty; but in all stand out prominently the wish to cast off the medical profession as an unclean thing, and the hope that in future medical officers may be known only as captains and colonels, etc. A few weeks back I had the opportunity of conversing with a staff officer of some standing on the subject. Without giving the exact words of the conversation, the following may be taken as a summary of his remarks:—"The difficulty he had, and he was not singular in this experience, was to know of what the Army Medical Department complained, and what it wanted. That the head of the department never once formulated in precise and unmistakable terms its causes of complaint and its requirements—in a word, never once acted as its mouthpiece. That the feeling of the Army Medical Staff seemed to be practically unanimous in favor of military titles, but that as their duties must remain medical, and their power to command must be limited as at present, he was at a loss to know where would be the gain. In fine, that he felt the situation to be as difficult to appreciate as bimetalism." There is much truth in the above. There never yet has been a coherent statement put before the Secretary of State of what the department requires to make it contented and efficient. It has always been my contention that this ought to be the prime duty of the Director-General and of his advisers.

I approach the discussion of military titles for medical officers with considerable reluctance, because I know that the conclusions I have come to separate me from many old friends, and because my present views are in some measure different to what I entertained when the question was merely

an academic one, and not pressing for solution. Naturally my personal leanings and my sympathies were altogether in favor of this claim. Notwithstanding this bias, the more I studied the question the more untenable seemed my original position, and now, viewing it not only from the standpoint of a medical officer, but from that larger field as to how it would affect the army either directly, or indirectly through the political and social movements of the day, I am convinced of its inexpediency. Well, then, a wider experience and a more extensive reading of the military history of the country has made me (reluctantly I repeat) recognize how fatal also it would be to professional progress, for of necessity it would still further push the profession to the background.

Recently a medical officer of ability, in discussing with me the advisability of giving military titles to medical officers, thus stated his opinion: "There must be distinctions between medical officers. The generic term 'doctor' won't do. The officer of five years' service is not on the same footing as the man of thirty, while the responsibilities of the latter are infinitely greater. Hence it is necessary that there should be gradation of rank, which should be on military lines. Some of the present compound titles are very cumbersome, so much so that even combatant officers give the professional affix the go-by in conversation and use the military only." I admit the force of these observations, but they do not carry home the conviction that the official titles of medical officers should be military only. Mr. Gladstone has recently written, "that we are all ruled in our judgments by our inclinations." If in his great career he has found this to be so, how much more truly can it be said of humbler natures, and of those to whom fortune has given a sphere of lowlier ambitions.

Again, I am advised by a friendly critic that "there is no earthly good in arguing against military titles, that the wishes of the many, backed up as they are by the entire profession, must carry the day; and therefore that to fight against it is simply to court failure, even though the evolution of the service on professional lines may be the higher ideal." The signs of the times are very much in favor of this forecast, but what of that? My belief is, and I give it after mature consideration, that if even these titles were now granted it would not be for long, but that it would hasten the time when the title must correspond with the employment of the holder—when to be a "Captain of the Host" will mean that and nothing more. The whole tendency of the age is to get rid of flabby generalities and jelly-fish affinities. The State has a perfect right to make the differentiations of its servants depend upon their duties, and upon them only. The schoolmaster is abroad. With the higher education of the people and the more general the diffusion of culture the nearer is that time approaching.

The arguments brought forward in support are chiefly derived from what is considered to be the analogy between the present service conditions of the Army Medical Staff and of the Royal Artillery and corps of Royal Engineers as these corps existed some years ago, when the right to hold a mixed command by officers of these corps was denied them. These arguments, though often made use of, are not advanced with that heartiness which insures belief. There is a lurking dread somewhere that the present

state of affairs hardly justifies the comparison. Notwithstanding the corps of Royal Engineers is specially signalled out for comparison, as its evolution from a civil basis is the more distinctive, and the more suggestive of the possible future of the Army Medical Staff. Lord Wolseley quite recently pointed out how neglected has been the teaching of the military history of England in our public schools, and even in our military institutions for the training of young officers. He has shown what a gain to the country this teaching would be in fostering patriotism, and by making the public better acquainted with the military needs of the empire. Herein ready at hand lies the explanation. There is no student of the military history of the British empire during the past fifty years but must be struck with the paramount part the corps of Royal Artillery, and the corps of Royal Engineers have played during this period in all our wars, both in attack and defense. From the Indian Mutiny down to the defense and relief of Chitral, every page of this history bristles with their glorious deeds—deeds which might have been glorious, but which would not have had such far-reaching consequences, had not they been scientifically planned and executed. I am not concerned in this argument with acts of personal bravery and of individual gallantry; were they the determining factors, then the history of the army, and of the Indian, medical services would suffice. But that is not the point. The point is this, that for both attack and defense, in fine, for all enterprises of war, both these arms of the service—artillery and engineers—are all-important; whereas the medical service in civilized warfare has no such duties, rather is precluded by international agreement from undertaking them.

If military titles be given to the Army Medical Staff, then to act logically, rather to act honestly, every service, every department of the State, employing members of the medical profession, should bestow upon them their respective titles. It has often occurred to me that if this custom prevailed in the sister service, then the whole range of the titles of executive naval officers would have to be appropriated by its medical staff. Absurd. The strict sense of discipline in the navy, the necessity of promptness of action, and the risk of confusion incident to the use of similar titles by officers with diametrically opposite duties forbid it. The same reasons apply with no less force to the use of military titles for medical officers in the army, unless the professional equivalent precedes them. This is a self-evident proposition, but being a question of common-sense it will no doubt meet with much opposition. How this claim for military titles has become so pronounced perhaps may be explained by the fact that the standard of precedence outside hereditary rank is a military one of which the title is the symbol, but that does not justify the appropriation of the standard itself. Had the system of officering the army continued as it existed six-and-twenty years ago, when commissions were bought and sold as medical practices are at the present time, this claim of medical officers might be considered to have some reasonable foundation, and would perhaps more fittingly meet the requirements of the medical papers as being "up to date." It is because the whole system of military warfare has altered during these years, and because medical science too has broadened her boundaries, that I can-

not subscribe to this new gospel. Let me complete my confession of faith. I know how my views are looked askance on now, but we are living in an age of transition. A new century with its great discoveries will soon dawn; I venture to say it will not be twenty years old before this gospel is dead, and as extinct as the megatherium and the dodo.

I have in the article already quoted pointed out how rampant is the spirit of militarism in the department. Like some fabled monster it lives upon itself. Were this title worship a harmless social ambition, it might be left to smoulder and to die; but this is not so. It exercises a pernicious influence on its everyday work, and, like some corroding canker, it is eating into the vitals of the department. The following two instances will suffice: In a station—the headquarters of a district command—a year or so ago, his Royal Highness, the late Commander-in-chief, was expected to make his annual inspection. To visit the sick in the station hospital was part of the programme. For hours the Army Medical Staff Corps were paraded in the hospital grounds to give a salute. Surely it would have been more decorous and more in keeping with the spirit of the place to have had these men doing duty in the hospital wards, crammed as they were with sick. There was a time when hospitals were used for the infliction of punishment, deserters and bad characters being respectively branded with the letters D. and B. C. within their walls. Those times have long since passed away, thank Heaven! How repugnant to one is this idea now. And so, too, in the near future, will be the association of hospitals with all other functions except those required for the treatment of the sick and the alleviation of human suffering. Again, shortly afterwards, in the same station, sixteen rank and file of the corps were paraded for company drill. This parade was superintended by the surgeon-colonel of the district, accompanied by a brigade-surgeon lieutenant-colonel, while a surgeon-lieutenant-colonel and a surgeon-major in turn put the men through their drill. Surely these officers might have been more profitably occupied with their medical and sanitary duties, which were of urgent importance and sufficient to occupy every moment of their working day. In any case it was not a duty for officers of their seniority, and might have been more appropriately left to a non-commissioned officer, under the supervision of a surgeon-lieutenant or surgeon-captain. To drive in a tenpenny nail with a Nasmyth's hammer is a useless expenditure of power. However this may be I cannot believe that this picture will be in existence some twenty years hence, except in a libretto of some comic opera of the day.

I have often heard the argument brought forward that it is on field service military titles for medical officers are essential, to mark their position, and to secure their orders being promptly carried out. Here, again, is an instance of dogmatic assertion taking the place of the actual fact. These titles must be associated with the names of the possessors, and on field service they are rarely employed. It is not difficult to see that if this were the custom it would cause endless confusion, and might lead to actual disaster. In consequence, officers are addressed, not by name, nor by title, but by the actual appointments they hold. Thus it is that orders are issued to the G. O. commanding a division or brigade, to the C. O. of a regiment,

battery, or company, to the P. M. O. of a division and to the S. M. O. of a brigade or field hospital, etc. The advantages of thus associating officers with their respective duties are obvious. I recollect, a few years ago, discussing this very point, namely, the connection of the duty with the title of the holder, with a general officer, who since then has become distinguished in the field. With a rough cynicism he asked me these questions: "Suppose a medical officer, on joining the department was given the title of field-marshal; how would that affect him in relation to his work? Would not the measure of his duties remain the same as it is now, and must not his power of command be limited to the sphere of his medical and sanitary duties? Will not his appreciation by the army outside his department depend upon how these duties are performed?" It was in reference to this claim of medical officers for military titles that this conversation arose. He who plays at bowls must expect rubbers, and therefore perhaps I could, without wincing, appreciate the pertinence of these questions. They are still ringing in my ears.

In the search for arguments in favor of military titles the example of the United States of America is often quoted, and its medical service is set up as a pattern to copy. In that country, where "one man is as good as another, and six times better," in every car, in every court, on 'change, and behind the counter, the irrepressible Yankee colonel is in evidence. I confess I could never see the force of this argument. This everlasting desire to copy other countries, combined with the habit of belittling home institutions, is repellent to me. I am well aware of the forces which are at work, but I should have thought that the medical profession, with its larger knowledge of mankind, would have been the last to have made use of them. The Army Medical Staff have a jewel of great price in their profession, but like a spoilt child, they prefer the setting. In this agitation one thing has particularly struck me, and that is, how little support the claim gets from the lay press and from the public.

At the risk of being tedious I have discussed the question at this length, for its settlement must be effected, not by outside clamor, but by departmental responsibility. I take it that honorary titles are neither acceptable to nor suited for, medical officers, and yet it is because of other departments possessing these titles that the medical department finds its justification. It is rather a petty way of looking at it, but this is one of the reasons most gravely advanced in favor of it. Should the present compound titles be continued, as I think they ought, there should be nothing about them to which exception could be taken. Excluding the title of brigade surgeon-lieutenant-colonel they are in every respect satisfactory. The objection I have to make to that title is that it corresponds to no army rank. The rank of brigade surgeon-lieutenant-colonel remains the same as that of surgeon-lieutenant-colonel. Hence this promotion is a case of simply "as you were"; besides, its inordinate length deprives the title of any utility as a means of conversational address. Every step in departmental grading should have a corresponding military rank. If not, of what use is the promotion? It certainly has been a frequent cause of complaint, and has been used as a medium to ridicule the whole thing. The number of

surgeon-major-generals and of surgeon-colonels, more especially of the latter, on the home and colonial establishments have been in recent years reduced; why not therefore make the military rank that of colonel. The administrative medical officers of districts could be distinguished from them by the designation of surgeon-colonel on the staff. As it would allow these officers to serve longer, the ultimate cost to the State would be inappreciable, which is of itself a recommendation.

I now leave the title question for what I consider the material and *bona fide* grievances of the department. I regret to have had to spend so much time and space upon it, and would have preferred to have treated it as Laing did the Gorham case, dismissing it with a simple D; but that was impossible, for until it is set to rest there will be no peace in the department. Most of the grievances of the Army Medical Staff have some financial importance, but none of them, I take it, present any great difficulty, always supposing that the regulations as regards pension and retirement, etc., be modified to suit the present conditions of the service. In my article on Army Medical Organization, which appeared in the December, 1894, number of this magazine, I called attention to this subject. Leaving out of consideration that automatic and gradual increase which the natural progress of affairs entails, I pointed out that a large increase in the cost of the medical service must be expected, unless its internal economy, root and branch, be investigated, and its terms of service altered. How true this forecast was, the medical vote for the current financial year proves, when it stands at £557,000, whereas twenty years ago it was only £373,000, the cost of the Army Medical Staff serving in India not being included in the above sums. I do not propose proceeding further with this financial question. To do so would unduly lengthen this article; but I will ask, where is this to end unless the measures I suggest are carried out? As a distressed taxpayer I pause for a reply.

The two first grievances, which will be now inquired into, have no financial importance; but they have had a sinister influence on the contentment and efficiency of the department. These are (1) the want of union between the Army Medical Staff and the Army Medical Staff Corps, and (2) that the responsibility of medical officers in questions of discipline, and in matters outside the sphere of their medical duties and of their present command, has not hitherto been precisely defined. I shall discuss them in order; but the most cursory reader will note that here are two vital questions affecting the department, and yet they are permitted to remain incomplete, or uncertain. A bimetallic strain runs through both.

With regard to the want of union between the Army Medical Staff and the Army Medical Staff Corps, what is wanted is the welding together of the two into one homogeneous body, with one title common to both. It seems extraordinary that this union has been so long delayed. For all practical work they are one, therefore the designation or title should cover both officers and men. Their duty is limited to the treatment and care of the sick. There is no fear that in the future this duty will be widened. Where, then, can the objection to their having a common designation come in? Again, whether the amalgamated body be given the name of service,

department, or corps, what objection can there be to make it a royal one? We are all servants of our queen. We are all animated with the same spirit of patriotism. The Army Medical Staff and Corps serve everywhere. They incur the risks of war, and they are also more than all others exposed to the dangers resulting from epidemic diseases. Why, therefore, should they not be shown some special mark of their sovereign's favor? To do so will not rob the army of any privilege. It will not take away from it any virtue, while it will add to the prestige of a service upon whose labors the efficiency of that army so largely depends.

The responsibility of medical officers in questions of discipline, and in matters outside the sphere of their medical duties and of their present command, has become a burning question. It has always been a sore point. Into the merits of Surgeon-Captain Fowler's case I have no desire to enter, nor am I in possession of all the facts which would warrant me to do so. The recent debate in the House of Common does not furnish so complete a statement as would enable one to form judgment. However this may be, the case has attracted so much attention that the question must be authoritatively dealt with, so "that he may run that readeth it." As I take it, the present regulations, though somewhat elastic, only impose this responsibility upon medical officers for occurrences similar to those partially witnessed by Surgeon-Captain Fowler, namely, to bring them to the notice of the senior combatant officer, or of the officer commanding the corps concerned, reporting at the same time their action to the S. M. O., under whom they may be serving, for the information of the P. M. O. of district. For every given case it may be impossible to lay down any hard-and-fast rule, but surely there ought to be no difficulty in determining the broad lines which should govern conduct. It is a fact within my knowledge that this uncertainty has been a constant source of irritation and of dissatisfaction to medical officers; what is more, it affords a legitimate basis for further agitation.

The other grievances are chiefly of a local character, though general. Officers on the home establishments complain of the shortness of the period of home service, the frequency of removal from station to station, and the increasing difficulty to obtain leave, either ordinary or for the purpose of study. The department has become impressed with the importance of keeping its officers contented, and with better administration these evils have been mitigated; but they will never be got rid of under existing circumstances. In my article on Army Medical Organization, already quoted, I have discussed this subject at considerable length. To do so here would be only to repeat the facts and arguments. Medical officers serving in the United Kingdom also complain that they meet with but little consideration from combatant officers. This, notwithstanding the social aspects, can hardly be said to be a personal question, because medical officers and combatant officers see so little of each other since the old regimental days. This separation is likely to increase as the senior officers die out, unless, perchance, a medical officer is posted to each corps for a term of years. In no other way can official action influence it.

The grievances of the Army Medical Staff serving in India are very real. The Israelites found the Egyptians hard taskmasters; but no harder mas-

ter can be found than the Indian Government. It will have its pound of flesh. No department, no service, has experienced this more than the Army Medical Department. As regards pay and allowances the department is worse off now than it was twenty years ago. The work has been increased a hundred-fold. Those officers who used to get horse allowance have been deprived of it. The pay of rank has not been conceded; both the junior and senior ranks equally suffer. I have had long service in India, and I am well aware of the discontent—the legitimate discontent—which prevails. I say this feeling alone is sufficiently strong to keep men from joining the service. I know it to be so.

I have endeavored in this article to give a plain statement of the grievances of the department, some of which I think are not real, and which only require explanation to be brushed aside; while, on the other hand, many of them are serious, and keep back eligible candidates. I think, therefore, it is time that the fullest inquiry should be made into them, and wherever an evil is found, corrected, and wherever a hardship exists, redressed.

GERMAN IDEAS UPON CERTAIN QUESTIONS RELATING TO FIELD ARTILLERY.*

(*An analysis of some articles in the "Militär-Wochenblatt."*)

Translated from the *Revue d'Artillerie*

By First Lieut. GEO. W. VAN DEUSEN, 1st U. S. Artillery.

IV.—SHOULD FUTURE FIELD BATTERIES HAVE 4 OR 6 GUNS.

THIS question is discussed by two writers holding entirely different opinions. We give the principal arguments of each.

In Favor of the Battery of 4 Guns.—There has always existed a certain relation between number of guns and rapidity of fire, at least in cases where the pieces are fired in succession from either flank and the effect of each shot observed. If, for instance, the firing commences on the right, it is sufficient for the right piece to be ready for firing as soon as the left piece has been fired; this is the condition which should regulate the number of pieces in the battery. From this point of view the Russian and Austrian batteries of 8 guns are too large, and it has often been proposed to reduce them. Motives of economy have heretofore prevented, though they have often been divided during firing to render them more easily handled.

Since the adoption of the automatic brake and smokeless powder, rapidity of fire has been greatly increased, and the new armament will undoubtedly produce a still greater increase. It is then pertinent to ask if it may not be advantageous to reduce the size of the battery. Let us first inquire as to the relative power of the 4- and 6-gun batteries.

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* Continued from Journal No. 83.

From the statements published by private firms, rapid-fire guns whose projectiles approximate to those used in the field-piece adopted for our service can fire from 5 to 7 aimed shots per minute. (The Krupp 7.5 cm. rapid-fire gun fires a 6.5 kg. projectile; the Russian field-piece, whose shrapnel weighs about 7 kg., can fire, according to Gen. Engelhardt, from 5 to 7 aimed shots per minute.) The actual firing is preceded by the following operations; opening the breech-block, inserting the ammunition, closing the breech-block and aiming. No special mention is made of the shrapnel fuse, since that is supposed to be prepared during the other operations. There is no longer any necessity for running the piece into battery as the recoil does not exceed a few centimetres; there is no primer to put in place; the manipulation of the sight is easy, as it is provided with a rack and screw; the drift is corrected for automatically on the sight and the direction is given by a lateral motion of the top carriage supporting the piece. Possibly so great a number as 5 or 6 aimed shots per minute can only be obtained with the aid of the skilled men employed in the gun factories, but at least four shots per minute can be counted on without the laying being neglected.

A four-gun battery can then fire 16 shots per minute, 3.75 seconds per shot, and one of 6 guns 24 shots, 2.5 seconds per shot. But the time of flight is actually 6.2 seconds (German field artillery), and this time diminishes very little with increased initial velocity; that of the 8 cm. Gruson shell weighing 7 kg., is 4.6 seconds for an initial velocity of 580 metres. Consequently, even with a 4-gun battery, the extreme rapidity of fire cannot be used if the striking of each shot is observed. This battery would then keep up a continuous fire from a flank just as well as one of six guns.

This reduction in the number of pieces presents advantages outside of those of an economical nature. Among these are the following:

1st. *Reduction in the Length of the Marching Column.*—It must be understood that only the pieces are reduced in number, not the caissons. It is necessary to transport an equal number of rounds since each battery fires with the same rapidity whether of 4 or 6 guns. If two pieces are taken away from each of the 20 batteries of an army corps, the length of the column is reduced 900 paces or 700 metres.

2d. *Reduction of Front.*—This is an advantage of the greatest importance, since, in the normal occupation of a position, the artillery of an army corps extends over a front of about 2600 paces, about 2100 metres, counting the intervals between groups prescribed by the regulations. Taking 5000 paces as the front in action of an army corps, the artillery will occupy at least half of this space. But there will be on every field of battle some ground that cannot be used by artillery, such as woods, villages, marshes, etc., so that it will be difficult to assure the arrival of each battery in its proper place in line. Even in 1870 the deployment of the whole of the artillery was often difficult, and the number of pieces to-day is 120 against 90 at that time. Reducing the battery to 4 guns will limit the space necessary for deployment to 1800 paces instead of 2600, and thus the artillery will not require more than a third of the entire front. In cases where the available space is not limited, the reduced number of pieces will allow better use to be made of the ground or the interval to be increased.

3d. *Ease of Controlling Fire.*—If the officer in charge of the firing is located in the centre of the battery, the flank pieces are only 30 paces from him instead of 50. Orders will be delivered more promptly and accurately, an important consideration when we consider the frightful tumult which will be produced in future battles. More careful supervision can be exercised.

4th. *Improvement in Instruction of the Battery for War.*—If the effective strength is not reduced with the reduction in number of pieces, the present batteries will be able to haul all their pieces if they are at "reduced strength."

The firing battery—4 guns and 2 caissons—if at "medium strength."

The fighting battery—4 pieces and 4 caissons—if at "full strength."

Thus—though it may seem a trifle paradoxical—it is not unreasonable to claim that a four-gun battery will produce better results in way of instruction than one of six guns.

The writer of the article, "The Armament, Use and Organization of Field Artillery" (*Militär-Wochenblatt*, 1895, No. 46), opposes the reduction to four guns; he claims that in the future rapidity of fire will not be based upon a successive fire from a flank, but upon individual fire by piece, conformably to the new firing regulations.

It is a fact that the regulations prescribe individual fire, but only for ranges under 1500 metres, and even this rule is not absolute, since in another place latitude is given the battery commander as to whether he shall continue firing from the flank or pass to individual fire. However we may consider this point, we cannot find plausible reasons to justify the use of individual fire at greater distances than 1500 metres. The present system which consists in firing alternate shots at two different ranges from the flank to determine the range is not compatible with this idea. The firing manual, it may be contended, provides for firing at only a single range, and consequently there can be no objection to individual fire. But in actual practice will it not be necessary to fire at alternate distances? Undoubtedly, since if only a single distance is used, we must count upon an accuracy of observation that will seldom be found in presence of the enemy. Possibly the writer proposes to use the echelon fire of Col. Langlois, in which the elevation is different for each piece, so that the ground is covered to a considerable depth. That would be permissible provided we could give each battery 15 or 18 caissons instead of 9.

In fairness it must be acknowledged that the reduction in the size of the battery presents one indisputable disadvantage. If the battery has only 4 guns, any losses incurred will be proportionally more felt. Suppose, for example, all other things being equal, that two batteries are opposed, one of 4 and the other of 6 guns. With 2 caissons in line, the 4 gun battery will have 34 men in line under fire, the 6 gun 47,—the difference being 1 chief of section, 2 chiefs of piece, 10 cannoneers. The 6-gun battery will thus be more vulnerable, since good shots will tell more against the larger personnel, and the absolute loss will be greater. But the per cent. of loss to the total number will be less, so it will preserve the ability to fight longer, and in the end will get the better of its opponent. To this it may

be answered that these reduced batteries will be better able to take advantage of cover and that they can more easily increase the intervals between pieces and thus will present a relatively smaller mark to be fired at.

It may be added that if the 9 caissons of the present 6-gun batteries be preserved for those of 4 guns, with all the accompanying personnel, these reduced batteries will have quite an important reserve force at their disposal, which would be an essential point for consideration in calculating the resisting power of these batteries. And if all these advantages do not suffice, we can complete them by adding quantity to quality. Among the 40 6-horse teams rendered surplus by the suppression of 2 pieces in each of the 20 batteries of an army corps, can easily be found the materials for 2 new batteries, and this number could easily be increased to 4 if some other concessions should be made. As the batteries need only 20 cannoneers instead of 30, the effective strength of the reserve can be slightly diminished without inconvenience. For instance, we may have each caisson carry only 4 spare cannoneers instead of 5, and so each one can transport from 75 to 80 kg. more ammunition, and thus do away with one of the caissons, without diminishing the total ammunition supply.

The suppression of 2 guns and 1 caisson will reduce the strength of the battery by 2 non-commissioned officers, 9 drivers and 12 spare cannoneers, and 2 battery wagons will no longer be needed; one will be enough if the load is increased slightly. If necessary each group could be provided with a wagon containing certain articles belonging to the batteries of the group in common. With his usual good sense von Ploennies said, in speaking of the foot soldier, that it was not necessary to equip him as if he, alone, was going to war. The saying is even more applicable to the equipment of those batteries which form part of a group.

Finally, as a result of the ideas we have endeavored to put forward, there would be rendered surplus in each battery, four six-horse teams, or 80 in an army corps. Here we have the elements of at least four extra four-gun batteries. If the army corps had 24 four-gun batteries instead of 20 six-gun the previously mentioned advantage arising from reduction in length of marching column would disappear, and that for reduction of front would be weakened. But it is certain that the power of these 24 new batteries would be greater than the 20 as constituted at present. This change could be made in peace without expense as it would only be necessary to transfer to the batteries of "reduced strength" part of the 243 batteries which are now actually at "medium strength."

ARGUMENTS IN FAVOR OF 6-GUN BATTERIES.

In our age of constant production and incessant change, perfect stability becomes more and more rare. Up to this time there has been no question raised as to the number of pieces suitable for a field battery. Now, on the eve of the adoption of a rapid-fire gun, certain writers appear in the military journals in favor of the 4-gun battery. The advantages presented by such batteries are given at length. In order to make the discussion complete, some of the inconveniences arising from the adoption of the measure should be given.

First, why does the artillery need a rapid-fire gun? Is it on account of this discussion as to the proper method of firing? No. It is because we must provide for great intensity of fire in certain extreme cases. Now how will we realize this desideratum if, at the same time that the power of each individual piece is increased, qualitatively, the good effect of this increase is destroyed by a quantitative decrease, that is, by calmly giving up a third of the pieces. This consideration has been entirely ignored in the article referred to.

The same writer also praises the firing from a flank with observation of each shot. "A battery," he says, "is too strong when the flank piece which is to continue the fire is ready before the last piece has been fired." The Manual certainly requires observation of each shot while the range is being found, but does not insist upon it after that period. The battery commander should certainly watch the fire continually, but that does not mean that he should limit himself to being a machine for automatically observing shots and correcting them. How many other duties devolve upon him outside of those connected with the simple act of firing! He must examine and look out for everything connected with the battery in order to be its true chief. And without following all the deductions of this writer, might it not well be asked what would become of the efficiency of a 4-gun battery when it had two pieces unserviceable through the fire of the enemy or from accidents incident to the firing? In our opinion, the 4-gun battery is too small a unit. Let us consider for a moment some of the advantages which have been especially thrust forward.

1st. *Reduction in Length of Marching Column.*—This reduction is only 700 metres and even that only in case of an army corps marching in a single column and with infantry following the last battery. Outside of this special case, the reduction would be still less. Generally, this advantage is of too small importance to be seriously taken into consideration from a logistic point of view. At any rate, if it is necessary to shorten the column at the expense of the artillery, it would be better to throw back some second echelons in rear of the infantry than to suppress 40 guns by a stroke of the pen.

2d. *Reduction of Front.*—What should be considered here is not the absolute increase in number of pieces since 1870, but the relation between the infantry and artillery. Our army corps has evidently been considerably changed since that period, but the percentage of increase of the artillery is not so considerable as would seem at first. Further, it is an exaggeration to say that in 1870 it was *often* found difficult to deploy the whole artillery of an army corps; it only happened *occasionally*, as shown by the history of the campaign.

It must also be taken into consideration that, as a consequence of the adoption of smokeless powder and improvements in fuses, firing over troops—while not to be done as a matter of choice—is no more to be dreaded than formerly. Also, thanks to the rapid-fire gun, future batteries will be better able than the present ones to assure their own safety by defending themselves, and so will have no need of a strong infantry support, an advantage when we are looking for a reduction of front.

3d. *Ease of Controlling Fire.*—It is evidently easier to direct the fire of four pieces than six. But we must remember that up to the present time this has always been satisfactorily managed in our batteries. If any further improvement is needed, recourse can be had to a repetition of commands by chiefs of section.

4th. *Improvement in Instruction.*—It is claimed that instruction in war tactics will be especially fruitful with 4-gun batteries. This does not seem to be quite reasonable, especially as to the cannoneers, for instruction is profitable in proportion to the number of men employed at the pieces. In peace exercises it is not desirable to have many men in the echelons, as the operations of war can only be illustrated there by a few quick representations, and consequently the personnel will remain there in a sad state of idleness and ignorance.

Our writer does not seem to be thoroughly convinced himself as to the harmlessness of his propositions. At the end of his article he proposes changing the numbers of 4-gun batteries in an army corps from 20 to 24; in this way the sacrifice would be only 24 guns instead of 40.

In any case, had he wished to give more weight to the few modest reasons which might act in favor of the 4-gun battery, he should have started in on a basis of not reducing the total number of pieces. Even with this express reservation, this transformation would not, in our opinion, be required by necessity, nor would it result in any marked advantage. We should rather see in it a marked disadvantage; the greater the number of batteries, that is, units of fire, the more ammunition must be expended in range-finding, which is ammunition practically wasted. With 6 pieces, we are in the best condition for range finding, and then to keep up a vigorous fire at the range obtained in spite of whatever losses may occur.

To conclude, we are decidedly opposed to any change leading to a sensible reduction in the numbers of pieces. We wish the artillery of the future to come forward to the public defense even more powerfully than in the past, but for that, it is not necessary to overthrow with one hand what we build up with the other. As a result of our technical progress and in the absence of the tests which war alone can give, there exists to-day among certain artillerists an excessive confidence in our strength and in the infallibility of the means of action which we have prepared during peace. Pushed to hyperacuteness, this feeling may entail many illusions. For one, it has produced the idea of sacrificing 40 guns in each army corps—to shorten a little the marching column. It proposes to suppress a third of our guns, which are our sole fighting machines in the artillery, in order to provide teams to haul, during peace, a few hundred more caissons. What would our comrades think of this, except that Saint Barbara was meditating suicide.

There is still a method of forming a reserve. The horse batteries of the cavalry divisions, with their 236 horses, to which must also be added the caissons with the division cartridges, 37 horses, are administrative units too heavy for a single chief. Even as combat units these batteries are, under some circumstances, hard to manage. Consequently many of the arguments in favor of the 6-gun battery and against the 4-gun lose their

force and even disappear when it is a question of these particular units, in which mobility and flexibility are so essential. Hence the lightening of these batteries seems not only admissible but even necessary. It can be done by forming them of four guns, or by cutting off the collateral vehicles which form an excessive ballast.

V. RELATING TO THE DENSE CLOUD OF SMOKE FORMED BY THE BURSTING CHARGES OF PROJECTILES NOW IN USE.

The projectiles now in use in the German field service have in their bursting charges a smoke-producing material which causes a dense cloud of smoke at the instant of bursting. From articles devoted to the consideration of powders we make the following extracts, especially in regard to the smoke.

Let us imagine, says the first writer, the opposing artillery in position. After a careful examination of the field with a pair of good glasses, and being guided by the direction of the sound and flash of the discharges, the range finding is commenced, and put through as rapidly as possible so as to commence the accurate firing.

Every artilleryman knows from the experience of the firing schools that, when the air is calm, the target disappears from sight very quickly, hidden by the smoke caused by the bursting of the projectiles fired against it, and that, from this moment, it is no longer possible to observe the shots, and firing must be suspended until the smoke clears away. The same result would be produced in the field.

Following up the same idea, a second writer speaks of the inconvenience of such a dense cloud. It is a mask, a curtain placed by ourselves in front of the enemy. It is then necessary to fire upon our own smoke instead of on the enemy. During the intervals in the firing necessary to allow the smoke to clear away, the enemy will have time to change his position, or prepare some unpleasant surprise for us. As a remedy for this inconvenience, it is pertinent to ask if it would not be practicable to make up the bursting charges of projectiles of smokeless powder, by adding to it some substance which would burn with a white, yellow or red flame. The great explosive force of this powder would render such an addition possible. The observation of the shots could then be made better than by the present smoke which hangs on so long. The objective would show up clearly against the flame of those shots going over, without being hidden by those short. Besides there would be no more interruption of fire, no longer the contumely of firing on the smoke of your own projectile.

The preceding question is closely joined to that of the rapid-fire gun. Given the present dense cloud of smoke, the efficiency of a piece of this type would be decidedly limited in certain cases by the settling of the smoke over the target. The substitution of a bright flame for the too opaque cloud now produced, would appear to be an essential condition in the adoption of a rapid-fire gun.

THE FOG OF WAR.

By Colonel LONSDALE HALE, Royal Engineers (Retired).

(*Aldershot Military Society Papers.*)

THE following pages contain a brief account of the "Fog of War" as it displayed itself in connection with the action of Kissengen, fought between the Prussians and the Bavarians on the 10th July, 1866. The "Fog of War" is the state of ignorance in which commanders frequently find themselves as regards the real strength and position, not only of their foes, but also of their friends, and also as regards the details of the ground over which the operations are actually being carried out. For obvious reasons, this fog rarely shows itself in our peace training over our well-known manœuvre grounds. The account is the substance of the lecture delivered on this subject at Aldershot on the 24th March, 1896.*

After the capitulation of the Hanoverians at Langensalza on the 29th June, 1866, the Prussians, commanded by General von Falckenstein, moved south against the 7th and 8th Bund Corps, which, based on Schweinfurt and Frankfort-on-the-Main respectively, advanced to meet them. Of the 8th Corps nothing was seen, but the Prussians came in contact with the 7th Corps on the 4th July, on which day a sharp encounter took place. Touch was, however, lost, and after a rest day on the 7th, von Falckenstein on the 8th moved von Beyer's division down the Frankfort road as far as Schlüchtern, von Goeben's division down the Schweinfurt road as far as Dölbach and Motten, followed by Manteuffel's division to Fulda. Von Falckenstein himself was with von Beyer's division. The information which von Falckenstein obtained on that day satisfied him that the 8th Corps had retreated so far that it need not be taken into account in his future operations, which he had already determined now to direct against the 7th, the Bavarian Corps. His cavalry had learned nothing of this corps during the day, and the general, therefore, came to the conclusion that he should not find it north of the Main. He ordered for the 9th, as a preparatory step to following it up, a concentration of his three divisions in and round Brückenau, whence he proposed to march in three columns on Schweinfurt. The distance from Brüchenau to Schweinfurt is 25 miles. The country to be traversed is very hilly with deep valleys. On the 10th the columns would strike the intervening unfordable river Saale at Hammelburg, Kissengen, and Waldaschach, each some 12 to 14 miles distant from Brückenau. Waldaschach is four miles from Kissingen; the latter place 10 miles from Hammelburg. On the 11th, the right column, von Beyer, would move up the Saale to Euerdorf, and thence in concert with the centre column, von Goeben, from Kissingen, would advance on Schweinfurt, followed by von Manteuffel's division from Waldaschach as far as Kissingen and Oerlenbach. The concentration ordered for the 9th was successfully carried out, but the reports from the columns showed von Falckenstein that he was in error in supposing that the Bavarians were not

* The account is derived from "Die Entscheidungskämpfe an der Fränkischen Saale, von Fritz Hœnig." Berlin, Mittler, 1895.

still between him and the Main. He had seen but a little way indeed into the fog.

The hussars with the right column reported that several cuirassier and lancer regiments were marching on Hammelburg. At Unter-Geiernest, five miles from Brückenau, they had struck on cuirassier and lancer patrols, which retired towards Hammelburg; no prisoners were taken. The information was supplemented by reports of the inhabitants to the effect that the main body of the Bavarians, 20,000 strong, had moved to Hammelburg.

The centre column reported, that in the morning, their hussars had found the village of Platz, six miles from Brückenau, occupied by cavalry and infantry, estimated at some squadrons and a battalion. At about 1.30 a small force of all arms had been pushed forward from this column against the Bavarians, who had taken up a position at Waldfenster, nearer to Kissingen; the Bavarians were driven back; and according to the statements of some prisoners taken had retired on Kissengen. Other statements made by the prisoners agreed with those of the inhabitants, that at Kissingen was a strong Bavarian force of all arms.

The dragoons of the left column reported Bavarian patrols in the direction of Bischofsheim, which lies eight or nine miles to the north of its intended line of march; and Bischofsheim itself was reported to be held by all arms.

Notwithstanding the alteration in the conditions under which the further advance on Schweinfurt would have to be carried out, the orders for the 10th were only slightly modified. The light field bridge train, which belonged to the centre column, was to be transferred to the right column moving on Hammelburg. The left column was to keep its main body halted on the Brückenau road, sending only its advance guard towards the crossing at Waldaschach; the centre column was to secure, also, the defile on the river at Euerdorf, five miles south of its own crossing point, Kissingen. The Bavarian corps, against which the Prussians were now advancing, numbered some 37,000 infantry, 3500 cavalry, and 136 guns. It comprised four infantry divisions, a reserve cavalry corps, and reserve artillery. The infantry armament was the muzzle-loader, and the corps was in every military quality, except bravery, inferior to its opponent. The commander was Prince Carl of Bavaria, a veteran of 70 years, a born fighter and still physically fit for the command. In the following narrative it is only the part played by von Goeben's division in the operations on the 10th July which will be recounted as an illustration of the fog of war.

The 13th Infantry Division, commanded by von Goeben, was composed as follows:

25th Infantry Brigade—Major-General von Kummer.—53d and 13th Regiments, each three battalions.

26th Infantry Brigade—Major-General Baron von Wrangel.—55th and 15th Regiments, each three battalions; Fusilier Battalion, Lippe; one battalion.

Reserve Brigade — Major-General von Tresckow.—19th Regiment, Lieut.-Colonel von Henning, 3 battalions. To von Kummer's brigade

were attached three-and-a-half squadrons 8th Hussars and two batteries. To von Wrangel's brigade one-and-a-half squadrons 8th Hussars and two batteries. With von Tresckow were the 4th Cuirassiers, four Pioneer companies, and a horse artillery battery.

Total—16 battalions, 9 squadrons, 31 guns—13,200 infantry, 1150 sabres, 31 guns.

In accordance with the orders issued, von Goeben, on the evening of the 9th, proceeded to arrange the work for his division for the next day. To von Goeben, himself, the country was new and unknown; the only map in his possession was an obsolete staff map on a scale of four miles to the inch. His division was in cantonments along the Brückenau-Kissingen road, the most advanced village occupied being Poppenroth, three and three-quarter miles in a direct line from the Saale. The shortest way to the river passed down the Kaskaden Valley and debouched at Friedrichshall, one-and-a-half miles north of Kissingen. Von Goeben determined to follow this road, although in doing so the distance between his column and the right column was thereby increased. He ordered, therefore, von Kummer's brigade, which was at the head of the column, to move off from Poppenroth at 7 o'clock on the following morning; von Wrangel's brigade, further in rear, was to march an hour earlier so as to close up.

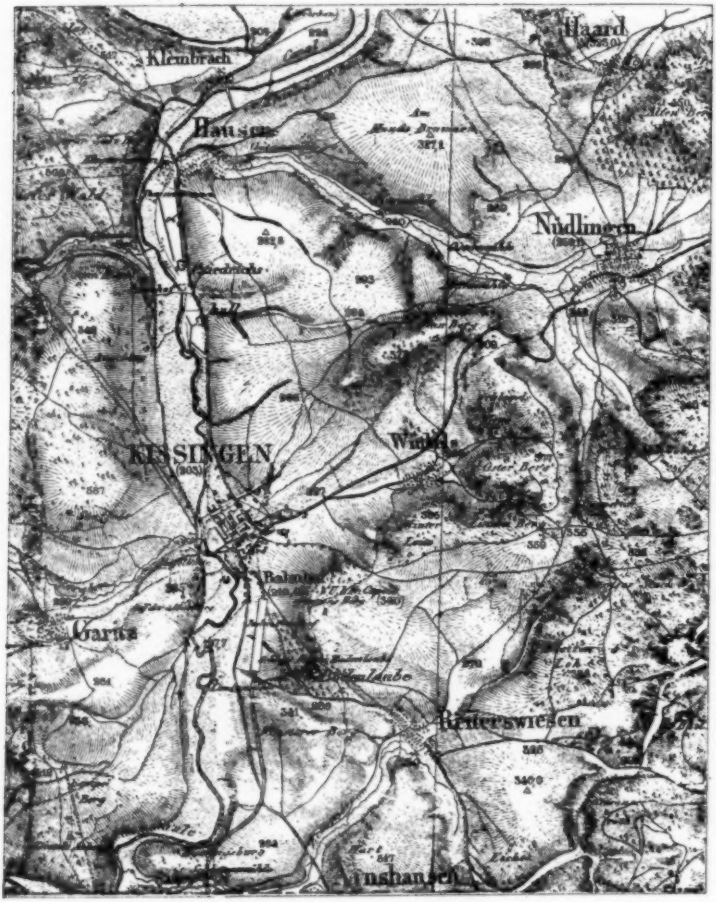
When, however, at the hour named, von Goeben arrived at the rendezvous, von Kummer's brigade was not there, and not for some time could its position be ascertained. It was collected one-and-a-half miles to the south-west at Schlimpfhof. It appears that von Kummer had made inquiries as to the nature of the country, and had ascertained that, though the river could be reached through the Kaskaden Valley under cover of thick undergrowth and high fir trees, yet the débouché was such as to impede deployment, as it would be within rifle range of the river, between which and the mouth of the defile was open meadow; moreover, the Saale ran along the Bavarian front. Artillery could not be brought into action, and the road south to Kissingen and Hammelburg ran along the outside of the woods and was within rifle range of the Bavarians. On the other hand, although the road by Schlimpfhof and Garitz was a détour, yet beyond Garitz there was room for the deployment of all arms, and the line of retreat of the Bavarians on Schweinfurt could be threatened in this direction. Early in the morning, von Kummer had dispatched to General von Goeben a hussar with a report of the change of rendezvous he had adopted, but the hussar's horse on the way cast a shoe, and the message miscarried. General von Goeben approved of von Kummer's independent action, and at 8 A. M., after a regrettable delay of an hour, the march commenced. Von Wrangel's brigade was, however, enabled to close up. The reserve brigade was directed to move to the right rear to Albertshausen, to secure the right of the division until the right column should have gone forward.

Meanwhile hussar patrols, which had been dispatched to the front at daybreak, returned with the information that Kissingen, and the main bridge there, were strongly held, and that infantry and cavalry with many vehicles were encamped behind the town. For the protection of the flanks, two battalions and half a squadron, under Colonel von der Goltz,

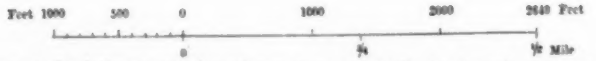
had been sent from the rear brigade to Friedrichshall; that officer was directed to act entirely according to the nature of the ground and the circumstances of the case, and so far as possible to join from that direction in a probable fight. From the leading brigade a battalion and one squadron under Lieutenant-Colonel Borries were sent to the right to protect the crossing at Euerdorf, and to maintain connection with the right column. As whilst continuing the march no Bavarian patrols were encountered, von Goeben was inclined to doubt that his advance was expected, when at Garitz the report came to him that a party of Bavarians was hastening back on Kissingen from the Altenberg, the hill forming the southern side of the defile. The general could now see that both that hill and the Staffelsberg, the northern side of the defile, were unoccupied, the river valley itself had not come into view, but the distant encircling heights on the opposite bank were visible in the clear morning air. With his two brigadiers he rode forward with the leading battalion, followed closely by the 4-pounder battery. The battalion deployed into company columns; the generals crossed to the lower slopes of the Staffelsberg, and, almost immediately, a shell fired from the further bank, at a range of 2400 yards, fell among the advance guard. The deployment of the advance guard was continued; the character of the defile through which it was passing will now be described.

The Staffelsberg on the left towers to a height of some 600 feet, the Altenberg on the right 280 feet above the river. The upper part of the Staffelsberg and of the northern extremity of the Altenberg are densely wooded; the lower slopes are more open, and with the intermediate low ground are covered with luxuriant crops, orchards and enclosures; the Garitz suburb extends into the defile and along the right bank of the river; as the houses are very substantial there was plenty of cover for the deployment even within range of the Bavarian rifles. The main bridge is some 90 yards long and 11 yards wide, the further end was closed by an apparently strong barricade, and 110 yards up the main street were a couple of guns enfilading the bridge. The southern portion of the town was not visible, but that the northern portion was strongly held by infantry was evident. Soon 10 guns had opened fire at a range of 2500 yards, a little to the north-east of the town. To gain the river bank an open meadow had to be crossed, and the river was swollen with rain, an enemy was lining the walls and occupying the houses on the opposite bank. Looking beyond the town, the view that offered itself to von Goeben was limited to the north-east by a projecting spur of the Staffelsberg; to the south-east by the shoulder of the Altenberg. He could see only from the Sinnberg to the Stationsberg. The general character of the ground within the encircling heights consisted of numerous wooded spurs with deep intervening gullies, but the details and nature of the lower ground between the hills and the river could not be seen. A direct frontal attack on Kissingen was also difficult, because the town being a health resort, von Goeben would not use artillery against it. The absence of any flanking artillery fire of the Bavarians on the mouth of the defile, and the strong infantry force visible in the town itself, led von Goeben to the conclusion that the main strength of the force opposed to him was posted for the defense of the town, and of the main bridge. He

had, however, soon after 10 o'clock heard artillery fire to the north, and expected to receive news from von der Goltz as to the state of affairs at Friedrichshall. Meantime, with the exception of one battalion held back

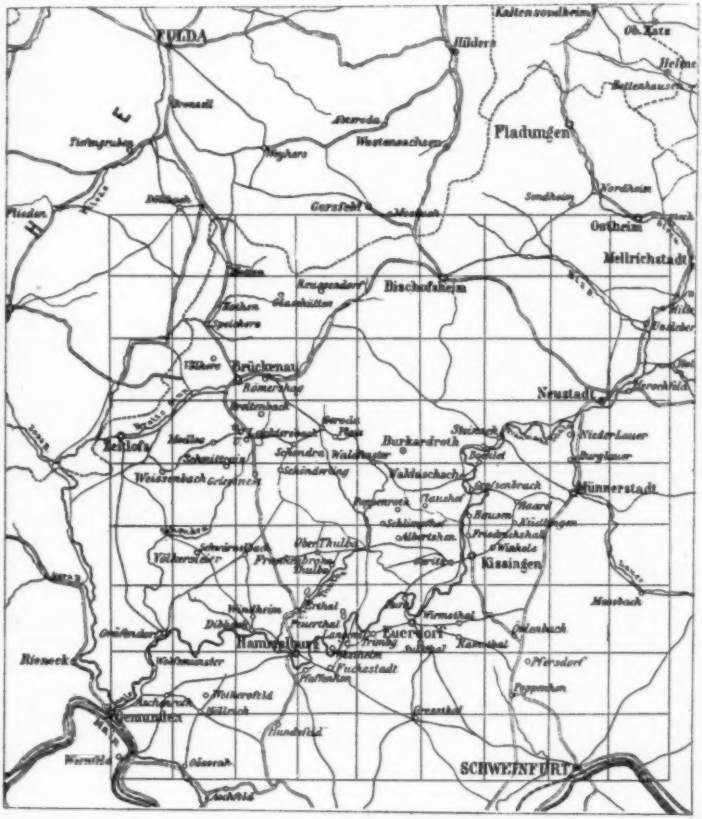


Scale—5·07 Inches = 1 Mile = $\frac{1}{12500}$



as reserve, the infantry of the advance guard had deployed, and by 10.30 had gradually formed a line some 900 yards along the Friedrichshall-Hammelburg road, and were engaged in replying to the Bavarian fire on the

opposite bank. The two artillery batteries were in action, and had driven the Bavarian artillery 1100 yards further back. Von Goeben knew that whatever was to be done must be done quickly; he had only his own division on which to rely; no bridging train was at hand; what was the actual strength of his enemy he could not tell; neither did he know more of



the ground on the opposite bank than its general character; that there was some enemy to the north of the town he knew from the firing he had heard; a frontal attack must be used as the last resort only; he determined, therefore, that Wrangel's brigade of five battalions, which was at 10.30 issuing from Garitz, should "advance south of the brigade already deployed, occupy the Altenberg, bring its guns into action on the hill, cross

the river below the town anyhow and anywhere, and then, on the further bank, make an enveloping attack against the town; meanwhile the other brigade was to maintain a continuous delaying fight in order to keep the attention of the enemy in this direction, but was not to attempt to cross the river until the troops of von Wrangel's brigade after crossing the river had penetrated into Kissingen from the other side."

Von Wrangel now led his brigade from Garitz to the south-western slopes of the Altenberg, where the brigade deployed and the men laid down their packs. Protected by two companies in extended order, which pushed over the hill down the further slopes, the guns of the brigade came into action on the top of the hill, the general rode over the hill to Villa Vay, and from this point was able to see and learn something about the river his brigade had to cross "anyhow and anywhere," the nature of the ground it would have to traverse, and the enemy he would meet on the further side, about which details von Goeben himself, when he gave the order, of course knew nothing. Except at its northern extremity, the Altenberg was so thinly wooded that even single individuals coming down its eastern slopes offered targets to the enemy's fire. Immediately below, a considerable expanse of level meadow, on which there was a good deal of bush and undergrowth, extended to the river, along the bank of which the Prussian skirmishers had found good cover. Some 800 yards south of Kissingen the river made a bend to the west and approached closely the foot of the hill. Beyond the main road which ran along the further bank was a width of 600 yards of low ground bearing luxuriant crops, and then with steep slopes, in some places 45 degrees, rose up from 400 to 500 feet high the Stationsberg, Ballingshain, the Bodenlaube, and the Finsterberg. From the edge of the woods covering the upper third of the Stationsberg a hot infantry fire had already opened. The southern houses of the town were also held. The absence of artillery opposite the Altenberg, on which von Kummer's guns were already in action, indicated that an attack from this quarter was not expected by the Bavarians. Von Kummer decided to endeavor to cross the river with two-and-a-half of his five battalions, holding the remainder in reserve under cover. How strong the Bavarians opposite to him were, von Kummer of course could not tell. No bridge or passage of any kind across the river could he see. The general now directed Major von Kaweczynski, commanding the first battalion of the 15th Regiment, to utilize the covered meadow for approaching the bend already mentioned, and to settle later for himself how to get across the river, and if successful in this, to attack Kissingen from the south. Seven guns now opened from the Altenberg on the wooded heights opposite, and also at 3500 yards against the Bavarian guns which had already retired into a second position; and to the three battalion commanders who were to cross the river, the order given was simply "to make an enveloping attack on Kissingen from the south," not to occupy the opposite heights. Whether the order would be practicable after the river was crossed depended of course on the occupation of the heights and the tactics of the Bavarians. And now about 11 A. M. Kaweczynski, with the second company, 15th Regiment, was approaching the Saale and could see the details of the ground.

Whilst full of anxiety as to the unavoidable losses he must suffer in carrying out the task, he suddenly saw below him in the direction of the Lindesmühle a small framework connecting the banks of the swollen river. To this point he now directed the company to move, and when Captain Bussche, its leader, arrived there, he found the framework to be the remnants of a partially destroyed foot bridge, 60 feet long. With some difficulty Captain Bussche, followed first by the more active men of his company, crossed by means of it to the other side, where in eight minutes the whole company collected, and taking advantage of cover soon gained the southern side of the high road, along which he secured a sort of bridgehead for the passage of the remaining troops, keeping up a hot fire on the Bavarians in the woods on the opposite hills. Table-tops and window-shutters were now obtained from Villa Vay, and by 12.15 some 2000 Prussians, crossing in single file, were collected on the left bank of the Saale ready to carry out the next phase of their task, the enveloping attack at Kissingen from the south. An attack by the 6th Bavarian Rifles was driven off, it is said, by a few rounds from the guns on the Altenberg. Once across, the Prussians seem not to have formed any definite plan for the advance, but companies, zugs, and sections indiscriminately made for Kissingen, which, at about 1.15 fell into their hands, the resistance being by no means obstinate, owing probably to the defense not being arranged to meet an attack from this direction. Whilst, however, the main body of the Prussians, who had crossed at the mill, turned north, a small party composed of three half-zugs of the 15th Regiment, under 1st Lieutenant von Mayer, 2d Lieutenant von Riedel, and Sergeant-Major Baxmeier, with some men of the Lippe-Detmold regiment, under Captain Groskopf, and numbering altogether some 200 men, moved east against the Bodenlaube and the Ballingshain, where they came to close quarters with the Bavarian infantry in the woods; over the steep-sided spurs, across the deep sunken lanes and tracks, this small body of men steadily drove back towards Winkels the left wing of the Bavarians, and it was here that the breech-loader told. The highly trained Prussians maintained their order in this difficult wood country, and were able by aid of their weapon to drive back attacks made by superior forces, whilst the less well-trained Bavarians were no match for their opponents when the latter took the offensive. By degrees this small body of men gained ground, and eventually at about 1.30 they had reached the high ground of the Stationsberg, overlooking from the south the cemetery which lies about 300 yards east of Kissingen. From the north, from the west, and from the south a semicircle of fire was now opened on the defenders of the cemetery, which the Bavarians evacuated at about this time, falling back on Winkels; a counter attack to regain it shortly afterwards being repulsed. So far the fighting had been carried through by the portion of von Wrangel's brigade which had crossed at the mill; now the main bridge having been cleared of the barricade, other troops of the division crossed; the order was given to halt and collect; and von Goeben had now to form his conception of the actual situation, and to determine what should be done next.

He had crossed the river, and he was in possession of the town, the cemetery and the high ground immediately north and south of the latter;

but the enemy had fallen back only to Winkels. As a preliminary to any further measures the whole of the infantry of the division, including the 19th Regiment from the reserve brigade which had moved up towards Kissingen during the morning, were collected at Kissingen; whilst the artillery and cavalry remained on the right bank of the river. And the next step was for von Goeben to endeavor to ascertain what part it was of the Bavarian army he had just defeated, and where the rest of it was likely to be, for it was only two o'clock in the afternoon, and the mere occupation of the town of Kissingen afforded no guarantee either that he would not be driven out by overwhelming forces before nightfall, or that on the next day he could continue his march on Schweinfurt. He therefore questioned both the inhabitants and the prisoners as to the strength and intentions of the Bavarians. Both inhabitants and prisoners stated that during the previous night there had been a brigade in Kissingen, and that during the morning a division had advanced on the town from Münnerstadt. Friendly Prussians sojourners in the town corroborated their statements. The prisoners taken belonged, however, to regiments in three out of the four divisions of the Bavarian army; and von Goeben had noticed a considerable amount of movement of troops between Kissingen and Winkels; the guns he estimated at, at least, three batteries; he had seen but little cavalry. Comparing the various items of information he received he came to the conclusion that there was a whole division in front him. From neither of the detachments he had dispatched to the river at Friedrichshall and Euerdorf had he received any reports whatever, and how strong the enemy might be on his flanks he could not tell. Nevertheless, Kissingen being untenable whilst the Bavarians held the high ground beyond, von Goeben at 2.15 determined, whilst keeping his guns on the right bank and a reserve of a couple of battalions in the town, to send forward on the Nüdlingen road his remaining available battalions to the attack. Whilst issuing these orders, however, came from his commander, von Falckenstein, news that von Beyer had with the right column struck on the Bavarians at Hammelburg, and at the same time an order was sent to him that, if not in action himself, he was to move against the right flank of von Beyer's opponents. This might reasonably lead von Goeben to believe that it was a strong force of Bavarians in front of von Beyer, and therefore to under-estimate the force in front of himself. But more inquiries at Kissingen soon induced him to come to the tolerably certain conclusion that in front of von Falckenstein and von Beyer was mainly cavalry only.

At Winkels, the Bavarians had taken up a position some 900 yards long across the Nüdlingen road with their guns on their right; and whilst von Kummer with the 19th and the 53d moved direct against it up the road, and Wrangel sought to turn it on the left flank, against both flanks were also moving small isolated bodies of Prussians, whom in the enclosed country the order issued after the capture of the cemetery to halt and reform had not reached. Though no Prussian guns came into action, the conflict was of short duration only, the 19th Regiment led the attack, and at 3.30 Winkels was captured and the Bavarians were in full but orderly retreat up to and over the pass and surrounding heights lying between Winkels and Nüd-

ingen. So difficult, so hilly and wooded is the country, that the Prussians, exhausted with the day's work, hardly attempted to follow them, and no pursuit to any distance was carried out. The Bavarians were driven down and out of the woods to the other side of the Nüdlingen brook, and then, with the exception of two small parties of Prussians whose action will be noticed later on, the Prussians drew back within the woods of the eastern slopes and to the western side of the pass. But before considering the orders they shortly afterward received from von Goeben, the new situation in which von Goeben now found himself must be described.

As already mentioned, von Goeben when he ordered the attack on Winkels was in a thorough fog as to what had been taking place, even at the short distance of two miles to the north on the river bank at Friedrichshall and at Hausen. Since the morning he had constantly heard artillery fire in that direction. His own small detachment under von der Goltz had arrived at the river about 10 A.M., but the guns he then heard must have been Bavarian artillery, inasmuch as he had not sent guns with von der Goltz. Between 2.15 and 2.30 this fire had, however, greatly increased, and it was possible that now von Manteuffel's advanced guard had reached Waldaschach, its designated destination, and might now aid him in the further work of the afternoon. The retirement of the Bavarians so far east as Winkels gave him access north up the east bank, and summoning, therefore, General von Tresckow, with the 4th Cuirassier Regiment and the horse artillery battery, he dispatched the general with these troops up the bank to find out what had been, and what was going on. Three hussar squadrons and the two reserve infantry battalions in Kissingen followed in support. From the general soon reached von Goeben two pieces of information. The first was, "Colonel von der Goltz is at Friedrichshall, but is unable to cross the river because the bridge is destroyed." Soon after came, "The advanced guard of Manteuffel's division has just occupied Hausen, it is not moving forward, and does not expect reinforcements; the enemy retired a short time ago from both places." Who the enemy was, what part of the Bavarian army had been fighting all the morning here on the safe side of the river, von Goeben could not tell, and meanwhile, the fog so far from being cleared by his success seemed to descend thicker than ever. From inquiries he had made he came to the conclusion that to him had hitherto been opposed the 2d Bavarian Division and one brigade of the 3d Division, but even before Winkels fell he received reliable information that in the morning strong bodies of troops of all arms, including a great number of guns, had been seen on the watershed dividing the Saale from the Main about halfway between Kissingen and Schweinfurt; they were estimated as at least a division. At the same time came a report from some of the skirmishers on the Stationsberg, that they had defeated the attempt of a hostile battalion to debouch at Reiterswiesen. Von Goeben found himself in a very difficult position, for he could not doubt that strong reserves about two and a half hours' distance were advancing on Kissingen in flank and on the rear of the Prussians. The troops just driven back at Reiterswiesen might be their advanced guard. Von Goeben could now account pretty well for three out of the four Bavarian divisions; the 20,000 at Hammelburg ap-

peared to be imaginary; von Goeben at once made up his mind not to allow his troops to go further away from Kissingen than the heights to the east, for every increase in the distance augmented the difficulties of the situation. The 19th Regiment was transferred to von Wrangel's brigade which was entrusted to take post on the Sinnberg and Schlegelsberg. Its two batteries were to join it from their present position on the further bank of the river, and three squadrons of the 8th Hussars were attached.

Von Kummer was to take the 53d Regiment of his brigade, and form with it a main reserve at Kissingen; of the other remaining available battalions of the brigade, one accompanied by a squadron of hussars was at once to proceed as far as possible on the road to Schweinfurt to meet the possibly advancing enemy, the other to remain at the southern entrance of Kissingen ready to move to the support of the first at a moment's notice. The cuirassiers and the horse artillery battery returned to Kissingen: von Kummer's two batteries remained on the further bank. Von Goeben had himself ridden to the Sinnberg to judge matters for himself as far as possible, and meeting the commander of one of von Wrangel's battalions, had dispatched this battalion to fill up the gap on the south flank at Reiterswiesen. It did not seem to occur to anybody to ask what was to become of von der Goltz's two battalions of von Wrangel's brigade lying idle on the river bank at Friedrichshall. So far, von Goeben in the measures he now adopted relied entirely on his own division. The head of Manteuffel's division is only two miles away at Hausen, but how it has come there, and why it is stationary and expects no reinforcements, he does not know. According to the previous night's orders its line of march was Waldaschach, four miles higher up the river.

The situation is certainly puzzling; von Falckenstein, from Hammelburg, has sent him a misleading demand for help; whether von Borries at Euerdorf had during the day communicated with him is not known; von der Goltz only one and a half miles away has been silent and dumb, and von Manteuffel's advance guard has come up in an unexpected place; and just at this moment into Kissingen rides Manteuffel himself, and considerably astonishes von Goeben by telling him that von Falckenstein had told him verbally in the morning to give up the march to Waldaschach, and that the advanced guard had been ordered to Hausen, that he had given a couple of guns at about 11.30 to von der Goltz; that the main body of the division was following Goeben, but would not arrive until towards evening; possibly he also told von Goeben of another verbal order of von Falckenstein in the morning, that von Goeben's own bridge train had been given up by the Hammelburg column and sent back to its owner; so all day had von Goeben acted in utter ignorance of the fact that a second division and a bridge train could have been called on to help him in the work he had carried through single-handed. Truly the fog had been among the friends as thick as between the foes. Von Manteuffel, senior to von Goeben, approved of the arrangements made by the latter, and von Goeben now confident of the arrival of von Mantueffel's division before he could be forced out of Kissingen, doubtless resigned himself to a certain amount of rest after the fatigues of the day. True there was a fitful crackle of musketry,

and an occasional sound of artillery fire over the heights beyond; but he had assigned to every one his own prescribed task, and each must carry it out for themselves; his own proper position was clear enough; at the centre, Kissingen, where he could receive reports from all points of the compass, and give directions if needed.

And, meantime, von Wrangel who at half-past three receives an intimation of his task to occupy the encircling heights of the Sinnberg and Schlegelsberg is, r ow that the Bavarians have disappeared over the hill-top and down the hill-side to Nüdlingen, attending to those multifarious details which must come before a general after the close of a victorious encounter. His troops are disposed on both sides of the road from Winkels to the top of the pass, a distance of between three-quarters of a mile and a mile, the rise being over 200 feet. The Sinnberg on the north and the Schlegelsberg on the south, with steep and densely wooded sides, enclose the pass, the hill-tops being some 200 feet above the road, whilst the Sinnberg bending round heads the pass and forces the road to turn due south, and then by devious windings down into the valley beneath to Nüdlingen. There is dense brushwood close to the road, and for some 750 yards on the north side, between the pass and Winkels, the edge of the wood is 200 yards from the road. A few hundred yards down the southern bend of the road on the further side a clear view over the country to Nüdlingen and the north can be obtained, but here no lookout was posted. Of what was taking place beyond the summit itself von Wrangel was in complete ignorance.

When at half-past three von Wrangel received his orders from von Goeben to occupy the two hills and not to go beyond the Nüdlingen brook, the 19th Regiment, under Colonel von Henning, was at the head of his brigade. Colonel von Henning at once recalled those of his men who had advanced as far as the brook, and ordered the remainder, with the exception of the 10th company, under Captain Wlosto, which was opposite the Hainmühle at the northeastern corner of the Sinnbergwald, to withdraw to the edge of the woods, and where possible, within it. The result was that this regiment which expected to be momentarily relieved, and for the time was provisionally the outposts, collected, with the exception of the company named, at the summit and along the road on the Kissingen side of the pass; no lookout being kept towards Nüdlingen. Von Wrangel had given the order to halt, but had omitted to follow it up by an order to assemble. The troops were therefore collecting independently and only by degrees, for in the close country it was difficult for the men to find their way about or to ascertain where their battalions were. Eventually the artillery and cavalry assembled near the village of Winkels, the artillery proceeded to unharness, the cavalry to unsaddle; in succession up the road to the summit assembled the three remaining available battalions of the brigade and the 19th Regiment. The men were thoroughly exhausted; the Kissingen waters, of which they had drank freely, not being of a particularly restorative character. Winkels was full of wounded. All medical aids had to be obtained from Kissingen; wagons and fatigue parties were sent for them, and also for the men's packs, which had been left on the Altenberg

The general seems to have been so fully impressed with the belief that the Bavarians had finally quitted the scene of combat, and would not renew the fight, that not even a cavalry patrol or a staff officer was sent to look over the hill crest and ascertain what could be seen beyond. The fog here was entirely of von Wrangel's own creation, and in it von Wrangel's brigade lay enwrapt, attending only to the immediate needs of the hour. But the repose could hardly have been one of silence, for from over the hill came unceasingly the rattle of rifles and the sounds of artillery fire.

In the latter phases of the fighting tactical connection had in many cases ceased; Major Kaweczynski, who had been the first across the river in the morning with his battalion, had continued on the right flank of the Prussians, and after the attack on Winkels, had with the half of his battalion which he kept in hand, crossed the Linnenberg, and on the Kalvarienberg above Nüdlingen kept up a fight with the Bavarian infantry and artillery protecting the retreat. Some of his men penetrated even into Nüdlingen itself. In view of the forces behind Nüdlingen he sent back to the 19th Regiment for reinforcements, but on receiving the reply that they could not be sent because the Nüdlingen brook was the limit of the operations, the major withdrew his men back towards Winkels. But as he retired there passed him, unknown to him, 2d Lieut. von Riedel with a weak zug of the regiment on his way to find and rejoin the battalion. Lieut. von Riedel passed on into the village and at once opened fire on the Bavarians from the eastern side of the village. Here he was soon joined by Captain von Wlosto with the 10th company of the 19th Regiment. Captain von Wlosto was in command on the left of the outpost line. When he saw Major Kaweczynski's men crossing the Kalvarienberg into Nüdlingen, he believed them to be the other flank of his own regiment, and he proceeded at once to Nüdlingen to join them. A third officer soon joined the party. After the Bavarians had evacuated Friedrichshall the adjutant of the second battalion of the 15th Regiment had managed to get hold of a boat and to transport himself and some eight men to the further bank; thence on foot he made his way as a patrol to the east, and eventually arrived at Nüdlingen. The general situation at this time then was, at Kissingen a strong reserve ready to move in any direction; at Friedrichshall two battalions lying idle; at Hausen, Manteuffel's advanced guard also inactive; Wrangel's brigade in charge of the pass and surrounding heights; the débouchés from the south and south-east guarded by battalions dispatched in these directions; a handful of Prussians carrying on an isolated and independent fight with the Bavarians at Nüdlingen.

Leaving now the Prussians, who have all along been in a fog as to the proceedings of any of the Bavarians except those with whom they have actually been engaged, and are still in a similar fog as regards the position of the Bavarian forces, the proceedings of the Bavarians since the 8th of July, when von Falckenstein made up his mind that they had gone home, will now be briefly narrated. So far from going home, the old leader, Prince Carl, had not the slightest intention of quitting the north side of the Main until he had done his best to give von Falckenstein a good thrashing. The only question in his mind was where the thrashing should be delivered;

how near to, or how far from, the north bank of the Main, and on which side of the river Saale; so as a temporary resting-place he selected Neustadt, on the Saale, on a level with Brückenau on the Fulda-Schweinfurt road, and there he was with his army on the 8th, on which day his adversary believed him to have gone far away. Here he could sit quietly, bide his time, and watch von Falckenstein as he moved by him on his way to Schweinfurt if he went in that direction. If von Falckenstein moved west he could follow him up. At Bischofsheim he put an advanced post of all arms to gain a closer insight into the Prussian movements. On the 9th he threw out across the bend from Waldaschach to Hammelburg a cavalry screen, and behind it at Hammelburg and Kissingen he placed infantry brigades, advanced posts being thrown out on the roads from those places to Brückenau. The heavy cavalry were sent to the extreme left at and beyond Hammelburg. It was these movements which, except as regards the strength of the force at Hammelburg, were correctly reported by the Prussians on the 9th. To Münnerstadt, on the 9th, he sent one of his infantry divisions, von Hartmann's, keeping the remaining two at Neustadt at his own disposal. So long as the Prussians were between Brückenau and the heights on the right bank of the Saale, the prince was kept very well informed of their movements; and on the night of the 9th he to all intents and purposes knew the intentions for the next day, namely, to cross the river at three points. But as soon as his cavalry and advanced posts were driven back towards the river, and he had to keep on the left bank, the fog fell between him and von Falckenstein; the latter knew as little what was happening on the east side of the river as the prince knew of the proceedings on the west side. It was a great misfortune for the Bavarians that as to the how, when, and where of meeting the Prussians, there were irreconcilable views held by the prince and the Chief of his Staff, von der Tann. However, on the night of the 9th, the movement of the Bavarians from Neustadt towards Schweinfurt was ordered for early the next morning, and it was begun very early. Hartmann's division and the reserve artillery moved down from Münnerstadt towards Schweinfurt, the brigades of the division at the river crossings were told to maintain their positions firmly, and the prince with the remaining two divisions moved towards Münnerstadt. But the prince could not tell exactly where the Prussians might intend to cross, so, although bound south, he left behind him at Bischofsheim two battalions, at Neustadt he left one battalion, to Steinach, a river crossing, he sent two battalions, and when on his arrival at Münnerstadt towards 9 o'clock information reached him that the Prussians were advancing on Kissingen, he sent to Hausen one half of the remainder of the second division and the other half to Kissingen. The prince after issuing some orders rode on to Winkels, and arrived on the battle-field at 10 A. M. He ordered von Hartmann's division to be sent for from the Schweinfurt road, and the 1st Division to come from Münnerstadt; no signs of the turning movement from the Altenberg were yet apparent, and he now rode over the Sinnberg towards Hausen to ascertain for himself how matters were going here. Only at Friedrichshall was there any hostile attempt visible. Here von der Goltz's two battalions, aided by a couple of guns from Manteuffel's

advanced guard, were on the further side of the river. So far as the prince knew they might of course be the head of a large approaching force, but even were this the case there would soon be opposed to them the reinforcements on their way. The Bavarian force hitherto here had consisted of some guns, cavalry, and a few companies of infantry. By 12.30 were on this part of the battle-field five battalions infantry, 20 guns, one brigade of cavalry, and two-and-a-half squadrons. And until they retired they had not more than 1700 Prussian infantry and 12 guns against them. Content as to the security of his right, the prince rode back over the hill towards Winkels, and at 1-45 arrived on the main Nüdlingen road at the moment when the cemetery fell into the hands of the Prussians. He at once ordered a counter attack, for now much depended on holding out until the arrival of von Hartmann's division. The shooting line on the Stationsberg appeared to the prince to be its leading troops, but his staff soon undeceived him by informing him that they were Prussians, not Bavarians. The prince now ordered the retreat on Winkels, expecting to receive there the flank support of von Hartmann's division, and sending an urgent message to that general to come on at once. The aid did not arrive, and then the prince ordered the retreat on Nüdlingen; the Bavarians opposite Friedrichshall and Hausen, owing to a combination of unfortunate circumstances, almost simultaneously retired also, and to the west of Nüdlingen the Prussians were left masters of the ground.

But not even now did the prince give up all hope of a favorable turn being given to the hitherto continuous course of disaster. The 1st Division, which had been early summoned to the front from Münnerstadt, began to arrive at Nüdlingen about 4 P. M.; the delay has not been explained. The prince determined with this division, aided by such men of the other divisions as had been rallied, to drive the Prussians from their position at the pass. What the actual position was he could not tell, for the hills stood up in front of him as a wooded wall, and what there might be beyond, or in the depths of the wood, he could not tell. However not a sentry showed himself to be on the look-ont. Overestimating immensely the strength of von Riedel's handful of men in Nüdlingen, it was only after a methodical deployment and subsequent advance that the Bavarians gained possession of the village, von Riedel and von Wlosto being both driven away to the southwest, and the last named officer leaving absolutely open and unprotected the flank of the outpost line, where the commanding officer of the outposts believed him to be. Whilst a force without much energy directed their advance directly to the front, General von Steinle, with three Bavarian battalions, passed north of Nüdlingen and unobserved for a march of twenty minutes, succeeeded in gaining the north side of the Sinnberg, and then scaling the northern slopes, crossed the crest, and descended towards the left flank and in rear of von Wrangel's brigade lying in fancied security along the road from the pass to face down the hill at Winkels. It was now now about 5.30, General von Wrangel was so impressed with the idea that the Bavarians had finally given up the struggle, that nothing moved him to take even the slightest trouble to assure himself of the correctness of his belief. At 4.45 there had appeared before him, coming down the road from

the pass, Lieutenant von Ditfurth, the adjutant, who with a patrol had made his way from Friedrichshall to Nüdlingen. Lieutenant von Ditfurth was dripping with wet from having twice forded the Nüdlingen brook, and addressing the general he said: "I have come from Nüdlingen, and have been driven out of the village by Bavarian infantry; strong reinforcements have arrived at Nüdlingen," he was about to add, "and are preparing to attack," when von Wrangel interrupted him—"Nonsense, my dear Ditfurth, none of your cock and bull stories for me; the Bavarians are running away; rejoin your regiment."

The 2d battalion, 55th, had now been ordered to relieve the 19th at the outposts; and were moving up soon after five o'clock when the commanding officer, Major von Gotzkow, who had gone forward to inspect the position, galloped back to the general and informed him that the Bavarians were advancing in force to the attack. Von Wrangel at once ordered up a battery and a squadron to the head of the pass, but the battery unlimbered at a spot where at short rifle range it could be taken both in front and flank under fire. And from the edges of the woods this fire soon opened on the guns, the cavalry, and the infantry in the vicinity. The squadron went about, and galloped down the road as far as Kissingen, knocking over the companies of the 19th, which were in the way; the artillery commander finding his position untenable hurried back to von Wrangel and reported the state of affairs to him; to which Wrangel replied that there were no Bavarians on the Sinnberg; the words were hardly uttered when from the woods burst out the column of von Steinle, and fired indiscriminately on the companies of Prussians scattered about. Von Wrangel had already sent to von Goeben for aid, but by the time a refusal reached him, the Prussians had been forced, after a most stubborn and protracted fight, to concentrate in a defensive position on a level with Winkels. On receipt of von Goben's answer von Wrangel said, "That is just like him; he gets out of his men the last ounce. Now we must see what we can do for ourselves."

Only one chance retained, a determined attack on the victorious enemy; and with the effort of despair the shattered troops dashed forward on the Bavarians; the Bavarians were exhausted with their previous efforts, their ammunition was failing, their advance had been wanting in cohesion, and now they were not able to stem the torrent which poured on them afresh. Slowly, but in good order, they fell back, and as night fell sought the shelter of Nüdlingen, and the fighting terminated.

The Prussians now took measures for real security, but did not attempt any pursuit. Although the battle had been raging from 5.30 A. M. to 8 P. M., and the pass is not more than three miles from Kissingen, it was not until past 9 o'clock that von Goeben became aware that any fight had taken place. A regiment from Manteuffel's division was at once sent forward and took over the outposts about midnight.

THE COSSACKS IN WAR.*

By Captain R. G. BURTON, Indian Staff Corps.

(*From the United Service Magazine.*)

THE traveller in Russia who possesses an inquiring mind will doubtless hear much of the degeneration of the Cossacks, should he seek for information among those who are acquainted with the subject. Indeed, the Russians make no secret of the fact, but aver with truth that the Cossacks are not what they were a hundred years ago, or at the commencement of the present century, when all Europe rang with their fame after the great part they played during the retreat of the Grand Army from Russian territory in 1812.

The causes of this degeneration, which is perhaps only temporary and remediable, are not far to seek. Races of warlike people, all the world over, who have enjoyed a long period of peace, and have turned their swords into ploughshares, must lose some portion of that military instinct which was formerly a part of their nature. So with the Cossacks. Inured to war in days gone by, for ever contending with the Tartars of the Golden Horde, sometimes defending their hearths and homes against their Eastern foes, at other times carrying the war into the enemy's country, continually engaged in frays, forays and raids, they became so far a warlike race, that that part of their lives which was not passed in actual campaigns was spent in military exercises. They lived to fight. From the Central Asian hordes they learnt those tactics which were subsequently employed with such effect in harassing an army, composed of the flower of European chivalry, led by the greatest soldier the world has ever seen.

But now all this is changed. The Cossack no longer goes forth to foray as in days of old. He lives a peaceable life on the land he cultivates for the support of his family, and when called out for military exercises he no longer employs his ancient tactics, but is taught in the same manner as the regular troops, so that he has to some extent lost those special qualities which formerly distinguished him. Perhaps it is in fact this "dragooning" of the Cossack that has spoilt him even more than a long period of peace. An excellent irregular soldier has been transformed into an indifferent regular. The Cossacks on their small horses cannot expect to contend in close order and regular formation against European cavalry.

It is now some twenty years since the Cossacks were included in the organization of the cavalry divisions of the regular forces, and since the general regulations were made applicable to them. People at that time began to say that the Cossacks were dying out, that there were no true Cossacks left, and that it would be best to turn them into dragoons. The campaign of 1877 did not raise the status of cavalry in general, nor did the Cossacks in particular have an opportunity of distinguishing themselves in that war with the Turks. Acting like regulars in close formations, they,

* Material for this paper has been obtained principally from articles by MM. Mitkévitch and Krasnoff in the Russian *Military Magazine*. General Bogdanovich's "War of the Fatherland," Bronzevski's "History of the Ttoops of the Don," and Klembovski's "Partisan Operations" have also been consulted.

on their little steppe horses, produced but slight impression compared with that made by a charge of heavy cavalry, and they were used more for minor purposes, as orderlies and escorts to convoys.

In days when he only did not rob and pillage who was not strong enough to do so, the Cossack was doubtless a robber, but in more modern times, although something of a freebooter, he was no worse than his contemporaries, for he was an excellent forager, and generally knew how to find a half-wild pig, or a chicken that had lost its owner. From being a freebooter he has become an agriculturist, and only the songs and tales of his fatherland remind him that he belongs to a race of warriors by profession. Nevertheless, is it not possible that his qualities still remain, though latent, that the warlike spirit smoulders, and only awaits an opportunity to burst into flame? Probably a long campaign would again bring the Cossack to the front, and his deeds would perhaps vie with those of his forefathers in 1812.

Their degeneration (so-called) has doubtless been in great part due to a proper want of appreciation of their qualities by their superiors. Already in 1836 they were in a state of decadence, although there must have been many among them who had taken part in great events a quarter of a century before. On November 2d of that year, the Emperor Nicholas inspected the troops at Novocherkask, consisting of some twenty-two regiments of Don Cossacks and horse artillery. The inspection was very unsatisfactory. The officers and non-commissioned officers did not know their places, and even the regimental commanders seemed to have a vague idea of their front. To complete the effect, the Tzar noticed the wretched Cossack horses, the varied and worn-out uniform of the men, and the absence of that bold seat on horseback which formerly distinguished the Cossack. The incensed Tzar turned to the Hetman Vlasoff, and said: "I expected to inspect twenty-two regiments of Cossacks, and I see some sort of peasants. And what officers! what commanders! No one knows which is his front."

Certainly things have improved since then, and will in all probability improve still further, for a strong party in Russian military literature has lately been directing attention to the Cossacks, and future wars may yet prove that they only require an opportunity to show themselves as good warriors as their ancestors.

The Cossack regiments of former days were raised in very irregular fashion. All depended on the commander, who was directed to raise a regiment, receiving a certain amount of equipment and clothing, with instructions regarding the numbers required, and the date on which the regiment was to be ready for service. The rest was left to the comandant, who was generally chosen by the Hetman from the aristocracy of the Don. As an example, let us see how Adrian Denisoff proceeded with his regiment in 1787, when he received orders to raise a corps of 1400 men. He formed a council of some of those who had had experience in the work, and, having enlisted a sufficient number of men, divided them into *sotnias*, or hundreds, appointed two officers to every *sotnia*, and proceeded to make what was required in the way of clothing and equipment. Horses were collected, for the greater part untrained and vicious, so that with all this, considerable

time was expended in arranging the interior economy and training the horses of the regiment, and as Denisoff had but three months at his disposal, only the last few days could be devoted to military exercises. In those days the Cossacks were mostly illiterate, both officers and men—for the former were chosen from among the older and more experienced Cossacks. The only regulations were some manuscript instructions, nor was there any drill or fixed words of command. But the Cossack was a warrior by birth and education; he was the son and grandson of warriors, and with his first lisp had learnt to speak of war. From eight years of age the Cossack boy srode fearlessly over the steppe on half-wild, bare-backed horses. In the winter time they built forts of snow, which they attacked and defended, armed with snowballs. On holidays they fired at marks, cut posts and indulged in various warlike games, and long evenings were passed in listening to the tales of raids and adventures with which the veterans fired the spirits of their sons. Thus they did not require any lengthy training; they learnt from experience, and from the lips of the veterans when they gathered round the camp fire on their march to the seat of war. They were armed with guns of various calibres, with swords, spears and pistols, all of which weapons they knew well how to wield.

And now, having equipped our Cossacks for war, let us take them forth to fight, and see what tactics they employed with such fatal effect. On outpost duty they were the eye of the Russian army. In foraging, in reconnoitring, and in carrying out any difficult or dangerous enterprise of guerilla warfare, the Cossacks were unequalled in the Napoleonic wars. Their principal tactical formation, if formation it can be called, was the celebrated Cossack *lava*,* which is somewhat difficult to describe, owing to the manner in which its character varied according to circumstances. This mode of operation was, it is said, learnt from the tartar hordes of Ghengis Khan and Tamerlane, learnt from the bitter experience of many a bloody fight, and afterwards used with success against regular cavalry.

The *lava*, then, was not a regulated formation, but a kind of national tactics, having no regular order, subject to no rules or words of command, but varied according to circumstances. The regiment was massed together, or stood in masses of sotnias, according to the orders of the commandant, the front generally occupying a considerable extent. Each Cossack attached himself to his *uriadnik*, or non-commissioned officer; each *uriadnik* kept his eye on his *sotnik*, or centurion; and all followed the standard of the commandant, or that of the *stanitza*, or Cossack village. The scouts gave information of the enemy's approach; the regimental commander called up his *sotniks*, explained his intentions regarding the attack, told them how to fire, whether from on horseback or on foot, and explained what signals he would give. The *sotniks* repeated the instructions to the cornets and *uriadniks*, and the latter to the Cossacks. Sometimes, after this explanation, when already in sight of the enemy, the commandant would address his Cossacks, and tell them to attack the enemy

*Mitkévich derives the word from a Mongolian word *laou*, meaning an inward movement towards a centre; but why should it not be derived from the Russian *loveet*, *lavlevat*, to catch or snare, since its principal object is to entice into a snare or ambush?

boldly, and ask them not to put their commander to shame. And they with one voice would reply, that they would gain him honor or die, a promise which was invariably fulfilled. Apparently the regiment listened to their commander's speech broken up into groups, and then, inspired by his words, they quickly turned and deployed into a long extended line, with flanks thrown forward, ready to attack or commence their endless manœuvres, as the case might be. The *lava* was varied in form, and had far other appearance than that of an attack in extended order; yet their was neither anarchy nor chaos.

This was what the French Marshal Moran says of their tactics in 1812: "We (the French cavalry) deploy, and boldly advance to the attack, and already reach their line: but they disappear like a dream, and we only see the naked pines and birch-trees. An hour later, when we have begun to feed our horses, the black line of Cossacks again appears on the horizon, and we are again threatened with an onslaught. We repeat the same manœuvre, and, as before, our operations are not attended with success. Thus one of the best and bravest cavalry forces the world has ever seen was tired out and disorganized by those whom it always considered unworthy foes, but who, nevertheless, were the real liberators of their country."

Such, then, was the Cossack *lava*. Having scattered to the extent of a couple of versts (2000 yards), the Cossacks would be unable to hear the commands of their colonel, and to establish order by the repetition of the words by all the officers would make too much noise in the ranks, in the midst of which it would be difficult for the *lava* to appear and disappear "like a dream." All were silent. The Cossacks ceaselessly followed their officers in a swarm, and all changes of direction and pace, and the signal for the attack itself, were made by means of the sword, the hand, or the movements of the horse. The comprehension by each Cossack of the object of the manœuvre, the longing to smite as many of the enemy as possible, these are what gave the idea to the movements of the *lava*, and attention to the commander gave order and simultaneity to those movements.

Supposing, for instance, that the *lava* occupied with its front an extent of two versts, in which extent there is a small but swift stream and a narrow ravine. The object of the manœuvre is to entice the enemy, a force of cavalry, towards artillery and infantry concealed behind a bush-covered slope at a distance of some four versts, or 4000 yards. The *lava* advances at a walk. Arriving at the stream, a number of Cossacks, at a signal from their commander, drop from their horses, which are taken charge of by a few comrades in the rear, and conceal themselves along the bank, whilst the remainder cross, and the *lava* proceeds on its way. Arriving within two or three hundred paces of the ravine, more Cossacks halt, and the *lava*, now looser, but occupying the same frontage, continues to advance on the hostile cavalry, firing from on horseback and galloping to within pistol-shot of them. But no sooner does the enemy send out one or two sections to drive off the bold horsemen, than the *lava* gives way, the flanks thicken, and from flanks and rear the Cossacks throw themselves on their pursuers with loud cries. Finally this manœuvring begins to harass the enemy, and rouse his anger. He sends out a regiment or two to punish the Cos-

sacks who, retiring, assemble into two groups, one of which makes for the stream, whilst the other takes the direction of the ravine. At twenty or thirty paces from the obstacle the Cossacks of each group turn swiftly off to the right and left, and pass round them. The closely formed squadrons launched in pursuit cannot so swiftly change the direction of their charge. Some fall into the stream, under fire of the Cossacks who were concealed on the bank, and others, disordered in crossing the ravine, fall into the other ambush; whilst at the same time the *lava* swarm has turned back, and attacked them fiercely in flanks and rear. The result is, the retreat of the hostile squadrons, the despatch of a stronger force, and a new enticement by the *lava*, this time towards the stronger ambush of infantry and artillery. For the success of such an undertaking it is obviously necessary that none of the manœuvres should be repeated. An endless change of locality, of time of year, and of day and night, gives means for a variation of the operations; so the *lava* is endlessly varied, formless, and intangible.

Such is an account of Cossack tactics given by M. Krasnoff, who also gives some description of another similar manœuvre called the *venter*. On the Don a *venter* is a fishing-net stretched on a succession of continually decreasing hoops, and ending in a sack. The fish, deceived by the first expanse, in the end finds itself in a confined space, where it cannot turn. In this manner the Cossacks select an enclosed locality, having several ravines playing the part of the meshes of the net, and entice the enemy into an ambush. This can be best understood from the following example, taken from the archives of the Russian general staff.

"On 8th July, 1812, at Corelichy, the enemy appeared from the direction of Novgrudok, in three columns of cavalry; but, being met by a headlong charge of the Cossack regiments in flank, could not hold Corelichy, and returned to Novgrudok. Night came on. General Platoff, Hetman of the Cossacks, pursued to Mir, and arriving within three versts of that place, halted to collect his scattered forces. Then, having received instructions to hold this point, the Hetman formed an ambush, called a *venter*, which was arranged as follows. In front of the village of Mir, on the road to Corelichy, was posted a force of a hundred men, both for observing the enemy and for enticing him towards Mir, and on the right and left sides of the road, in covered spots, were made ambuscades of one hundred Cossacks each, so that when the party on the road had enticed the enemy between these ambushes, they might attack his flanks, whilst the retreating party faced about and joined in the fight. A regiment posted at Mir was to support this attack, whilst the remainder acted under the immediate command of the Hetman. Platoff's dispositions were crowned with complete success. Three regiments of Polish Uhlans, under General Turno, fell into the ambuscade on July 9th, were utterly defeated, and pursued fifteen versts beyond Mir, losing many killed and 248 prisoners, including some officers. The loss of the Cossacks in this action was very slight, for they did not exchange shots with the enemy, but attacked him straightway with their spears."

Such were the tactics of the Cossacks during the epoch of the great Napoleon, regarding which Bronzevski says: "In the day of trial, glorious

for Russia, but fatal to Napoleon and France, the Don Cossacks stood in the first ranks of the defenders of their country. The great deeds performed by them in the war of the fatherland form the golden epoch in their history, and surpass all the glory and renown won by them in previous campaigns." As water, falling drop by drop, loosens a stone, so did these partisan operations of the Cossacks undermine the existence of the grand army, and contribute to its destruction. For vivid descriptions of the romance of Cossack frays and forays the reader may be referred to the luminous pages of Gogol's "Taras Bulba," and the life-like scenes of Tolstoi's "War and Peace."

Operating against the Tartars in 1774, the Cossacks, man for man, were equal to, or even stronger than, their foes. Both Cossack and Tartar were well mounted on small steppe horses, and rode them equally well, and were alike skillful in the use of arms. The moral superiority was on the side of the Cossacks, the numerical, on that of their adversaries.

It was at this period that the celebrated Platoff, at that time a colonel only twenty-three years of age, and subsequently a famous Hetman, came to the front. Appreciating the conditions of battle with the Tartars, he perceived that the employment of the *lava* would have been foolish, as it would be impossible to tire out his Tartar foes. Each Cossack would have been set upon by two or three Tartars, and in a short space of time the *lava* would no longer have existed. When in April, 1774, Colonels Platoff and Larionoff were directed, with their Cossack regiments and one gun, altogether a force of not more than a thousand men, to escort an immense convoy with supplies for the Cossacks in Kuban, the Tartar Khan, Devlet Hirey, resolved to avenge his defeats. He had on his side, including the forces of the mountain princes, an army more than twenty times as numerous as the Cossacks. With these troops he took up a position under cover near the river Kalala. However, it was not so easy to deceive the vigilance of the Cossacks. Having guessed the enemy's intention, Platoff and Larionoff chose a convenient spot, parked their convoy, and awaited the onslaught. The Tartars thereupon advanced to the attack, firing not very accurately from on horseback; but, nevertheless, the Cossacks suffered very severely. A third of the horses and many Cossacks had already fallen, when Larionoff proposed to Platoff that they should surrender, but the latter persuaded his comrade to await reinforcements, for which single Cossacks had been despatched. Towards evening Uvaroff's Cossacks and Bukhvostoff's hussars appeared on the scene. Then the Cossacks with the convoy mounted their horses, and advanced to meet their comrades, whilst the Tartars, not knowing what reinforcement had arrived, turned and fled, leaving many trophies in the hands of the victors. In 1864 the Ural Sotnia defended itself against the Turcoman hordes at Tkan in the same manner.

The Cossacks are skilled in crossing streams, and even broad rivers. They have, besides others, the Tartar method of crossing with the *sala*, which consists in constructing a platform of reeds on which the saddle and gun are placed; the Cossack with his horse then plunges into the water, the *sala* being tied to the horse's tail, whilst the man holds on to the mane, and swims across. The *sala* is useful on the march, but in action there

would be no time to collect reeds and construct a platform. In such cases the Cossack used to act as he thought best, sometimes desperately, always boldly and adroitly.

In the papers of the celebrated Hetman Denisoff we find the following account:—

"During the Polish rebellion of 1792, in the action of September 18th, on the Visla, the Commander-in-chief of the Russian army, Ferzen, decided to cross the river at a forest in which were the enemy's troops and batteries. After a cannonade on both sides, two of the Cossack regiments, Ivan Karpoff's and Serebryakoff's, received the order to cross the Visla directly on the enemy's batteries. The Cossacks divested themselves of their uniforms and their horses of their saddles, and with spears only in their hands rushed out of the forest, and, uttering fierce shouts, plunged into the Visla. The Poles were so alarmed at this attack that they abandoned all points and fled."

Again, on September 16, 1809, Platoff's advanced guard and Miloradovich's corps met the grand vizier's army at Rassevat. Prince Bagration, Commander-in-chief of the Russian army, directed the battle in person. Count Platoff's journal in the archives of the Russian general staff tells us: "In front moved a thick line (the *lava*) of Cossacks, under command of Count Stroganoff. In rear came the infantry in three columns, having columns of mounted Cossacks and dragoons on the flanks. The Cossacks commenced the action by firing from on horseback, and in places attacked with their spears, and soon beat back the enemy's disordered crowds of horse. Then the Cossacks retired to the rear and flanks to breathe their horses and the infantry attacked in squares. As soon as the enemy was overthrown, and commenced to retreat, the Cossacks, dragoons, and uhlans pursued him. At the town of Beylik, eighteen versts from the field of battle, a portion of the Turks took to boats, and sought safety on the far bank of the Danube. But the Cossacks observed some Turkish sailing vessels higher up the stream, filled with the fugitive enemy from Rassevat. Colonel Karpoff's six Don Cossack guns dashed ahead, and sank four of the boats, whilst the remaining six managed to reach an island near the left bank of the river. Some Cossacks then swam across with incredible boldness, reached the other side, and slew all the Turks who had not yet succeeded in escaping from one of the boats, and returned with six boats and the guns they contained." After the occupation of Moscow by the French in 1812, there was for a time a cessation of hostilities, during which the Cossacks closed in on all sides, and established themselves as posts of observation on all the roads. Their movements were always secret and generally made by night, whilst during the day they concealed themselves in forests or ravines, whence they issued forth and harassed the enemy whenever an opportunity presented itself.

The important effect of their operations was so well understood by Napoleon that he frequently issued special orders regarding the measures to be taken for warding off their attacks. On October 7, 1812, Murat wrote: "My position is terrible. * * * It is impossible to forage without great risk of being taken by the enemy; not a day passes that I do not lose some

two hundred men. How will this end?" And this hopeless condition was due principally to the operations of the Cossack partisans.

Such, then, is some account of the operations of the Cossacks in war in the past, and we have yet to see that their tactics in the future may not be equally successful.

In German military literature writers of repute have been engaged in considering the question of the best manner of contending against Cossack tactics, to which considerable attention has lately been directed in Russian military circles; the Germans foresee great difficulties before their cavalry should occasion occur for their meeting the horsemen of the Don, and it behooves all those who contemplate such a possibility to devise means for meeting the Cossack *lava*.

Combined with regular cavalry, and employing their national tactics, the Cossacks may prove even more serious adversaries than they were in 1812; for they may have a knowledge of the movements of regular troops as well as their own. They may harass their enemy's cavalry, draw them on to the attack, and "disappear like a dream," but in their place will be seen, not merely "naked pines and birch trees," but threatening squadrons of heavy cavalry, fresh and ready to attack the disordered and exhausted pursuers of their Cossack comrades.

THE ACTION OF CAVALRY AND HORSE ARTILLERY ILLUSTRATED BY MODERN BATTLES.*

By Major E. S. May, R. A.

(*From The Journal of the Royal United Service Institution.*)

I CANNOT help feeling that in giving a lecture on the subject of Cavalry and Horse Artillery I have placed myself at a slight disadvantage in limiting myself, as, according to the programme, I have done, to modern battles for my illustrations. To find the best instances of cavalry and horse artillery acting in coöperation, we must go back to the wars at the commencement of the century, and we might also find in our Indian campaigns, which can hardly be termed modern warfare, several brilliant examples of these two arms mutually supporting one another. The short time at our disposal will not, however, allow us to examine records so far from our own day, when the conditions of the situation as regards armament were so widely different from what they are now, and where we cannot take a comprehensive view it will be better only to regard what is most likely to be of immediate benefit in these latter days. We shall, therefore, confine ourselves almost entirely to the war of 1870, the first occasion since the introduction of breech-loaders on which two great opponents faced one another similarly equipped. You may, however, fairly ask me why, if horse artillery is in modern times still a necessity to cavalry,

* Major May has recently published an interesting and valuable work on this subject, produced in the United States by Messrs. Roberts & Co., New York.

as I believe it to be, and if, as I also believe, there is still a great future before horsemen, still verge and scope for the action of squadrons even on the battle-field itself, you may ask me, I say, why modern warfare does not present us with such salient examples for our purpose this evening as do the great struggles of past years. It is a fair question, but, I think, I can give you a complete reply to it. But before I do so I will ask you to bear with me a moment while I explain to you how it was that horse artillery was called into existence at all. When you understand its *raison d'être*, you will better appreciate the argument I shall bring forward.

Now the origin of horse artillery was briefly this:

When Frederick the Great set himself to perfect his army, and turn it into the magnificent fighting machine it ultimately became, one of the first reforms he had to introduce was with reference to the employment of his cavalry. The world was just then, as it is now, hugely impressed with the value which new improvements had given to musketry, and there was a tendency even with cavalry to rely on lead rather than on steel. Frederick found his squadrons waiting to receive an attack in position, and then, having poured in a volley, charging to take advantage of its effect. All the dash and enterprise which should distinguish the most mobile arm were therefore gone, and the dragoon had become a bad trooper and a worse musqueteer. The genius of the king saw that such tactics took away all the characteristics that made cavalry valuable, and he set himself to stamp out the heresy energetically. I may here remind you that we see an example in our own times of history repeating itself, in the manner in which the fire action of cavalry has been accentuated, especially in the Russian army, where they have armed the dragoons once more with rifle and bayonet, and this new departure is regarded by many with the same dislike as it was by Frederick. His measures to improve matters were somewhat more decisive than we are used to now-a-days. He issued an order to his squadrons, "Nimmer zu halten, nimmer zu stocken, aber immer stets zu attackiren," that is to say, they were *always* to attack, and, further, he declared that any officer who waited in the old way to receive the enemy should be tried by court-martial.

His cavalry, trained and splendidly led by two of the most capable cavalry leaders that ever lived, Seydlitz and Ziethen, were soon renowned for the precision and rapidity of their swoop, and have probably never been surpassed.

But having developed its "shock" powers at the expense of its fire effect, he had to make the latter good in some other way.

Cavalry is essentially an offensive arm, it cannot defend itself except by counter-attack, and in certain situations it is at the mercy of a few well-placed marksmen. "Cavalry," Napoleon tells us, "cannot reply to fire, and can only fight with the steel." Batteries of artillery lightly equipped, and with their detachments mounted like troopers, were therefore organized by Frederick to move and act with cavalry, and supply them with the powers he had shorn them of. And the coöperation of the two arms was, and has since been, found to work out in another way, to the benefit of both, because, while guns loosened compact formations for the horsemen,

the cavalry forced the scattered troopers to draw together, and thus present an easier target to the guns.

Napoleon, who appreciated the value of fire more than any man of his time, and also reaped immense results from a skilful use of cavalry, recognized the value of a mobile artillery too, and under this great example its use became general. Napoleon, too, more than any other general before or since, taught his cavalry to act with boldness in reconnaissance work ahead of his armies, and it was by means of the information as to his enemy's plans and position which an abundant and energetic cavalry placed at his disposal that many of his most celebrated strokes were rendered possible. Thus, during his advance to Russia in 1812, Murat, with the advanced cavalry, was often fifty miles ahead of his army. So it was that not only did cavalry in his day come into collision with the enemy on the field of battle to an extent such as we shall never see again, but cavalry raids and combats took place ere the main forces came in contact at all. A powerful cavalry meant a vigorous pursuit. Other nations, to meet his horsemen, had to adopt similar tactics, and thus great opportunities for the action of cavalry and its complement horse artillery were given in the long wars that marked the end of the last and the commencement of the present century. And by no batteries were opportunities more worthily turned to account, let me add, than by our own brilliant troops in the Peninsula, and in Belgium a few years later.

During the long period of peace, however, that succeeded Waterloo, which represented the lull after the storm, many of the lessons of the great battle-fields were forgotten, and when in 1870 the Prussians sent the ubiquitous Uhlans roaming through Fraace, men stared in amazement as though a new epoch in the art of war had opened. Yet they were doing but that which Napoleon had shown to be essential to the safety of an army 70 years before, and did not do it either nearly so well as he had done.

But the French had not profited by the study of military history as their opponents had, and their squadrons, brave and eager as they proved themselves more than once in the actual fight, were held aimlessly in hand, tied to the same road on which moved the other troops. No cavalry was sent scouting far away in front or on the flanks, and even in retreat they rarely or never attempted to prevent the inquisitive inroads of the pursuers. It takes two, we all know, to make a quarrel, and a cavalry combat is no exception to the general rule. There were few in 1870 because the German troopers had it, to use a familar expression, "all their own way." Consequently, the horse artillery and cavalry had no need to support one another, and there were in 1870 only a few examples of their coöperation in the most important rôle they can be called upon to adopt.

Such, briefly, is the explanation, and it applies also largely to 1866, of the fact that we find richer ground for research if we retrace our steps to the earlier periods. And it is very necessary that you should understand this, because it is as certain as anything in this world can be that, if we have another great war on the Continent in the near future, we shall again see the two arms we are dealing with working together, to an extent and upon a scale which even Napoleon never dreamt of. All nations have

studied and profited by the lessons of 1870, and on all sides we see signs that tell us that vast swarms of cavalry will shroud and protect the advance of modern armies. When both sides adopt these same tactics, their cavalry will surely come into collision, and we shall see squadrons supported by horse artillery taking part in contests which will materially affect the progress of subsequent events.

In 1870, when the cavalry divisions of the Germans were thrust forward alone, horse artillery always accompanied them, although when the battle took place we find them employed apart from the horsemen in the general line of battle; for guns, be they horse or field, must never be allowed to stand by idle when their fire may be utilized.

But, besides being essential to one another in this most important rôle, cavalry and horse artillery will find opportunity and need to work harmoniously together in other emergencies.

Horse artillery and cavalry will form part of the immediate advanced guard of every considerable force, will have to reconnoitre the enemy's strength and position, delay his onset, or check his retreat, until the main body arrives.

They will also, perhaps, find their most useful and most honorable rôle in covering a retreat of their own side, and it is to their skill, readiness and, if need be, self-sacrifice, that their comrades look for salvation in the most trying circumstances in which soldiers can be placed.

Horse artillery and cavalry may also be employed on the field of battle itself to make a flanking movement, or, by their mobility, forestall the enemy at some important point.

And finally, they may act together with advantage in pursuit of a beaten foe.

But since the action of horse artillery and cavalry acting together by themselves affords to the brilliant leader the best chance of distinguishing himself, and is the most characteristic, the most effective, and, alas! the most difficult rôle in which the combined efforts of the two arms can be utilized, I will first speak of it, adding to the ideal and theoretical description a few instances from recent warfare, by way of illustration. And I may preface my brief remarks on this point by explaining that, according to the latest regulations, a cavalry division would, in our service, usually be composed of 2 brigades, or 6 regiments of cavalry, with 4 machine-guns, 2 batteries of horse artillery, and a battalion of mounted infantry, to which likewise 2 machine guns would be attached. We shall be hardly within the limits of our discussion this evening if we enter into the question of, how these latter-day adjuncts to the cavalry division are to be employed. The Germans carried infantry in carts on more than one occasion during the war of 1870, and our mounted infantry may show themselves useful in advance of the main body under certain circumstances again; the question, until we have some experiences of recent war to go upon, must, however, be a theoretical, perhaps a controversial, one, but, since the question of an escort to guns has ever been a difficult one, the new additions will, in this respect, probably prove a welcome assistance and support.

For, in the event of a collision between bodies of cavalry being immi-

nent, the guns will be called upon to move rapidly and boldly forward straight to their front, considerably ahead of the horsemen. And this for two reasons: to get into action, if they can, before the hostile artillery, and to gain as much time as possible in which to produce their effect. The exact distance they should go forward must be left largely to circumstances, but Von Schell, a high authority, says they should advance one-third the distance which separates the opposing forces. Another distinguished officer has recommended the artillery commander to watch carefully the opposing lines, estimate as far as possible the spot on which the two front lines of squadrons will come in contact, and strive to get into position 300 yards short of, and the same distance on the flank of, the point of first conflict. We may note how much judgment, how much boldness, how much decision is therefore required on the part of him who leads the guns, and how immeately associated their action, to be effective, must be with that of the other arm. Some one will, perhaps, object that it is dangerous to send guns thus boldly forward? Why? If the hostile squadrons fall upon them they will do the very thing they should not. For if the cavalry and guns are really working together, when the enemy turns on a battery they will expose their own flank to assault, and, in any case, they can, after all, injure the artillery but to a very small extent. What may appear temerity is, therefore, the surest bid for success.

The guns will usually be on the flank, and their outer flank will need protection. A squadron would usually be detailed for that duty, and might have to dismount some of its files in certain cases to call in the aid of fire.

It is obviously a mistake, however, thus to weaken the cavalry, for they will need every sabre in the coming *mêlée*, and therefore it is not unlikely that a sphere of usefulness will be opened up here for the mounted infantry and machine-guns, in which they may on occasions display their special characteristics with success. The point to be specially noted is the very short time there will be for the guns to produce an effect, and that against a varying target also. For the artillery officer will have to exercise quick decision as regards the choice of his objective. Is he to fire at the enemy's guns, or at their squadrons? The answer is that the arm at the moment the most dangerous must be attacked, and circumstances must influence him here.

It is for these reasons that extreme quickness, or what we call smartness, has been looked for, both from officers and men who wear the jacket. It was not through mere bravado, or to please the gallery, therefore, that the old troops took pride in getting off a round quickly, but because, since it was necessary to get to a short range in order to have a chance against their rapidly-moving target, none of the fleeting moments might be wasted. Even in these days of long ranges in combats between cavalry such as we are describing, which will herald the approach of struggles on a larger scale, distances and opportunities will still be short as ever, and the same qualities, both physical and mental, will be needed in the horse gunner, if he is to do his duty properly. The gunners, too, were, and are, men selected for their physique, because in order to leap on a limber or mount a horse with facility something more than the average stature of the soldier is required.

No more pitiable object is to be seen than a little man trying to get on the back of an impatient charger, with one foot in the stirrup and one on the ground, especially if a Ghazi with a long knife is coming after him! The labor of running guns up after their recoil during rapid firing is also immense, and requires strength on the part of the detachment.

We may find an illustration of the severe labor that is sometimes thrown on gunners in this respect from the records of the Egyptian campaign of 1882.

In the very first action of the war two guns were sent forward from Ismailia to gain possession of a dam across the Sweet Water Canal at Magfar. These guns were in action for several hours in heavy sand, and the detachments became so exhausted by the labor involved in working the guns that they became completely unable, in several cases, to carry out their duties. The drivers had to be called upon to take their turn at the wheels, and subsequently the aid of the marine artillerymen, who were in action close to, had to be invoked.

As to the question of what projectile the guns are to use, as a general rule, it may be assumed that shrapnel will probably be fired at the personnel of the enemy's guns in the earlier stages of the action, but, as soon as the first line of his squadrons comes within effective range, it would seem desirable that the greater part, at any rate, of the guns should open on them with shrapnel shell and percussion fuses, or even with common shell. It will be impossible, in the short time at disposal, to bore time fuses, and the effects of common shell, both moral and material, should be great amongst horses. If the hostile guns are not harassed by a lively fire, they will have free scope to play upon and demoralize our own horsemen.

As soon as the two front lines of horsemen have met in conflict, the guns may turn their attention to the second line and reserves, and ward off any flank attack.

In the event of success or failure being distinctly pronounced, the rôle of the guns would be obvious and need not be dwelt on, but occasionally it may be a knotty point for the leader of the batteries to decide whether he should remain in action or whether he should retire to some position in rear. He must leave selfish considerations out of sight. But which will be best for his friends? Probably to stay unlimbered, for it is during a repulse that guns may be of most assistance, and it is often the last round that tells. Yet to stay behind too long may cause the cavalry losses in a desperate attempt to extricate them. The artillery leader in this position has need both of pluck and judgment, and his state may be likened to that of a man watching his friend battling with a wild torrent, and uncertain whether to leap in at once and make a hopeless effort to save him, or stay for a moment to launch a boat.

The most difficult position of all, however, would occur when a mingled mass of friends and foes comes surging back upon the guns. It would be a very knotty point to decide whether the guns should, under such circumstances, remain in action or limber up in the hope of getting a clear front of fire further to the rear, and the exigencies of the moment must be allowed to settle the problem. As a general rule, however, it will be the best to re-

main in position. It is in crises such as these that the support of guns may be sufficient to turn the scale, and to withdraw would, in the majority of cases, be a risky proceeding. Von Schell suggests the heroic remedy of firing indiscriminately into the confused mass, thus disentangling it, and forcing the enemy to loosen his grip. There are no instances, as far as I am aware, of such drastic methods having been deliberately adopted, but it is scarcely likely that, even had they been, a record would be preserved in the official account.

There was an occasion during the Crimean War, however, when something of this kind did occur. Dr. W. H. Russell, then correspondent to the *Times*, wrote as follows concerning the action of the Russian artillery after our light brigade had made their celebrated charge at Balaclava: "At the very moment when they were about to retreat, an enormous mass of lancers was hurled on their flank. Colonel Shewell, of the 8th Hussars, saw the danger and rode his few men straight at them, cutting his way through with fearful loss. The other regiments turned and engaged in a desperate encounter. With courage too great almost for credence, they were breaking their way through the columns which enveloped them, when there took place an act of atrocity without parallel in the modern warfare of civilized nations. The Russian gunners, when the storm of cavalry passed, returned to their guns. They saw their own cavalry mingled with the troopers who had just ridden over them, and, to the eternal disgrace of the Russian name, the miscreants poured a murderous volley of grape and canister on the mass of struggling men and horses, mingling friend and foe in one common ruin." It is to be noted, however, that the action of the Russian artillery was unjustifiable in this case, because our cavalry were not bearing down victoriously on their enemy's position at the moment, but were leaving it. The statements of eye-witnesses, whom I have consulted, likewise throw considerable doubt on the account as given by Dr. Russell, and it is very probable that the Russian gunners acted less deliberately, and that their friends suffered less at their hands than we are led to believe by it. Should an artillery officer, however, ever be placed in so trying and painful a situation that, in order to save the bulk of the force he was acting with from destruction, he felt bound to run the risk of sacrificing the lives of some of his friends, his motive would be a commendable one, and should not expose him to censure, far less to execration.

With reference to the value of the assistance some riflemen may be to horse artillery in certain situations, and the allusion which has been made to the employment of mounted infantry in this manner, we have, as far as I am aware, no experience in war subsequent to the Crimean era. During the affair of the Bulganak, however, the day before the battle of the Alma was fought, the need for an escort of infantry was felt by our horse artillery, and the want was made good in an impromptu manner, which appears to foreshadow what may be done in the future more easily and effectively through our modern organization.

The Russian cavalry and horse artillery were supported by three or four battalions of infantry, and, as these advanced, our two troops of horse artillery (I and C), under Brigadier-General Fox Strangways, galloped forward

from where they already were in action against the Russian cavalry and Cossacks, their fire from their new position being effective. The Black battery of the Light Division was also soon in action. The Russian cavalry, feeling the effect of the artillery fire, quickly retired out of range, and C troop, as Lord Raglan did not wish a general engagement brought on, moved back to the ground about 300 yards in advance of where they had at first come into action, and fronted the Russian infantry and guns, both of which had now been reinforced. Sir George Brown had by this time got the Light Division up, and extended in line, but just out of sight behind the ridge, and he, or Lord Raglan, desired that some men of the 2d battalion Rifle Brigade might be taken on the guns of C troop to act as sharpshooters, in the event of another advance into action. "This battalion had practiced with the Minié rifle at Canterbury in 1853. The Light Division regiments had all, or nearly all, been at Chobham Camp in 1853.

"The riflemen were accordingly placed on each axletree box, one on each trail, and three on the limber boxes; the limber gunners themselves stood on the trail handles, and held on by the limber boxes. This was done with the concurrence of General Strangways, and Sir George Brown was afterwards pleased to call the troop his 'Rifle troop'; however, there was no further attempt on the part of the Russians to renew the fighting, and this ended the 'affair of the Bulganak.'"*

It does not seem unreasonable to assume that, had Lord Raglan had at his disposal the resources one of our leaders of to-day will possess, he would gladly have utilized their services on this occasion; and the incident is interesting as an example of the unforeseen demands which the exigencies of the battle-field occasionally impose upon us.

Such are some of the more salient features of the action of horse artillery and cavalry acting independently of the other arms. As we have already noticed, there are but few examples of such action to be gathered from the war of 1870, perhaps the only genuine one having taken place during the small affair at Buzancy, on August 27th, during MacMahon's celebrated flank march to Sedan.

The Saxon Cavalry Division, covering the front of the XIIth Corps, which was to cross the Meuse at Dun, had assembled its 23d Brigade at Landres during the forenoon. The 24th Brigade was sent forward to the north to reconnoitre, the 18th Lancers working towards the Buzancy-Stenay road, while the 3d Cavalry with a battery of horse artillery had reached Rémonville, and pushed forward an advanced guard, consisting of one troop of the 1st and two troops of the 5th squadron, towards Buzancy. At about 11 o'clock this advanced guard reported that there was a regiment of French cavalry in front of it, and that the town was occupied by the enemy.

Now, the troops observed were the cavalry of the 5th Corps of the French, which was so disastrously defeated at Beaumont three days later, and which was now formed up at Bar, Brahaut's cavalry division being pushed ahead of it as far as Buzancy. Two squadrons of the 12th Chasseurs were on the south of that town, the issues of which were held by dis-

* See the "History of C Battery, A Brigade," by Colonel F. A. Whinyates, p. 91.

mounted troopers, but the bulk of the cavalry were still on the north of it. Meanwhile, on the German side, the 18th Lancers had concluded their reconnaissance, and had moved to Rémonville. The leader of the 24th Brigade (General Senfft von Pilsach), having now united his brigade again, ordered it to move forward through Bayonville. He then rode on to the advanced guard, and, seeing the weakness of the opposition, ordered it to charge the chasseurs. This was done, and with such good effect that the hostile squadrons were driven back to Buzancy, and, in spite of the carbine fire with which they were received, the Germans succeeded in pressing into the town after them. There a hand-to-hand *mêlée* ensued, and the French, coming on in superior numbers, gradually forced their opponents from the houses and pursued them for some distance beyond. But the captain of the 1st squadron (Von Woldersdorf) had taken up a position on the east of the Rémonville road, from which, in the event of the weak advanced guard being forced backward (which was what actually occurred), he might fall on the flank of the pursuing French and take them in a most vital point in the midst of their career of triumph.

It seems to me that this same Von Woldersdorf (I do not know if he afterwards rose to distinction or not) was a man imbued by nature with a genius for war. Many of us can be wise after the event, can show how Napoleon ought to have won Waterloo, or Moltke have lost Gravelotte. But this man was wise before the event, and displayed judgment and decision at a critical juncture during the fleeting moments of a cavalry combat. Ninety-nine officers in a hundred moving in support of that advanced guard would have manœuvred somewhere in rear of it, but he, with an instinct which did not lead him astray, carried his command boldly to a position from which the greatest results were bound to follow on its swoop. He appreciated the situation and recognized the decisive point. In one word, he acted like a born soldier.

The event proved the correctness of his judgment; his attack on the left flank of the chasseurs enabled the flying Germans to rally and face their foes, and the chasseurs, assailed both in front and flank, were driven back once more within the shelter of the houses.

But now the weakness of cavalry is exemplified. The carbine fire from the village denied further progress to the Saxons, who fell back to a distance of some hundreds of yards from it, while the remainder of the brigade moved up to Sivry.

And now the guns supplemented the efforts of the horsemen. The battery of horse artillery was brought into action on some heights close to, and directed a well-aimed fire on the chasseurs, who, supported by the musketry fire, were again advancing. The fire of these guns was so effective that, as the official account tells us, the French "withdrew in such haste that a squadron of the lancers (it had not yet been engaged), which was now likewise advancing, was unable to reach them." At 1 o'clock the skirmish had come to an end. The two German squadrons who were engaged had lost 32 men and 27 horses; both the captains were wounded. Twelve French chasseurs and Lieutenant-Colonel de la Porte, who was wounded in several places, were made prisoners. Subsequently the French

fell back from Buzancy, and the Saxon cavalry division was sent to reconnoitre towards Nouart late in the afternoon, the cavalry working towards Nouart, Barricourt, and Villiers-devant-Dieu.

The affair is only regarded as a little skirmish in the German official account, but is, nevertheless, interesting and remarkable as being, perhaps, the most characteristic horse artillery and cavalry action in the whole war. It brings out also the value of artillery well, as the French, although in superior strength in, and on the other side of, Buzancy, are stated to have declined the combat owing to their having no artillery to support them.

And what was the result of the want of enterprise on the part of the French cavalry? Briefly this. Three days later, the men of the 5th Corps were round their cooking pots at Beaumont getting their dinners ready, when German shells came tumbling into their camp. Their cavalry had not secured their safety, you see; they did not know of the foes that were closing in upon them, and the surprise of Beaumont foreshadowed the disaster of Sedan.

I have shown you, too, the value of horse artillery to cavalry, and how the French felt the need of it here, but I don't wish any one to imagine that I speak in any prejudiced or partisan spirit. Far from it; cavalry well led may overpower guns too. And if you care to see the other side of the medal, look at Tobitschau.

It was an action fought on the 15th of July, 1866, when the Austrians were retreating from Olmütz. On that day Bredow's cuirassier regiment (remember this Bredow, for he is a good soldier too, and you will hear of him later on), ably led so as to take advantage of the lie of the ground, got in amongst a great Austrian battery in action, and their charge was so sudden and effectual that the regiment captured 18 guns, 7 wagons, 168 horses, and 170 prisoners, with a loss of only 8 men and 12 horses. A noble prize truly for one regiment, and an excellent example of the power of cavalry in the hands of an adroit commander.

As an instance of the employment of horse artillery in an advanced guard action partaking of the nature of a reconnaissance in force, the most brilliant example in recent times that we can mention is the battle of Vionville, because the consequences of the bold intervention of these two arms on that occasion were immense and far-reaching, and because the audacity with which they fastened on the immensely superior French forces is unrivalled in the annals of war.

Bazaine was endeavoring to make good his retreat westwards from Metz, while the Germans were sweeping round his flank in order to throw him back on that fortress. To hold the enemy fast till reinforcements might have time to come up was, therefore, of vital importance.

The 5th Cavalry Division at 9 o'clock on the 16th of August surprised the bivouacs of Forton's cavalry at Vionville, and at once the four horse artillery batteries that were with it began shelling the French camp from the Tronville heights.

A German officer, General Eltorff, has just published a pamphlet, as a supplement to the well-known *Militär-Wochenblatt*, dealing with the performances of this 5th Cavalry Division at the battle we are considering. This

is how he describes the wonderful scene that the Germans saw when they first mounted the heights east of Tronville :—

"Just as our advanced patrols had informed us, a large French cavalry bivouac is found on the west of Vionville. Some squadrons are busy watering their horses, some are cooking, not a charger is saddled ! Truly a picture of the most peaceful, easy-going existence found haply amid the turmoil of war, and this, too, in the closest and most dangerous proximity to 4000 hostile troopers only waiting impatiently for the order to attack !

"In a moment Schirmer's battery unlimbers on the height which commands the enemy's position, and suddenly pours down upon it a perfectly unexpected and most withering fire, which falls especially on the Brigade Murat and the squadrons which are busy watering. Major Korber's battery quickly joins the one already in action, and the hussar regiments extend themselves on either side to cover the flanks of the guns. The very first shells which fall screaming and crashing into the camp throw everything into a state of the wildest panic, and the French cavalry in a few moments fall into a confusion which is simply indescribable."

The French had made no use of their cavalry, you see, to patrol or reconnoitre towards the enemy ; the German shells startled them at breakfast, as I have shown they disturbed their dinners at Beaumont, and they were absolutely unprepared for this attack. This is what the official account says : "At the very first round of shell the hostile cavalry fell into wild confusion. A French squadron, indeed, attempted to advance to the north of the village of Vionville, and a battery to the north-west of it, but both were unable to hold their ground against the fire of the Prussian guns ; they speedily followed the rest of the cavalry, which abandoned the camp in the greatest confusion, and disappeared in an easterly direction." Then the German horse artillery galloped further ahead and began cannonading the infantry camp about Rézonville, which the flying horsemen also threw into great confusion. The horse artillery of the 6th Cavalry Division also now pressed forward and came into action alongside their comrades in front, their fire being also most demoralizing.

Now here we have a very excellent example of the manner in which mobility, which is the distinguishing feature of a cavalry and horse artillery force, may be turned to account ; and remember that the cavalry, although they might have startled the French momentarily, could have effected nothing substantial without the fire with which the guns endowed them. A few dismounted troopers might have checked them till the others could get under arms, but the infantry would soon have advanced and driven them away. As it was, these latter did rally in a short time and advanced in superior numbers against the batteries. The position of the guns was, therefore, shortly very critical, but Von Alvensleben, who commanded the IIId Corps, fully appreciated the necessity for fastening his grip immovably on the French flank, and battery after battery was therefore hurried on to the front, and in course of time a long line of artillery was built up which defied all the efforts of the Frenchmen, and formed a solid framework on which the infantry divisions deployed by degrees.

We cannot go into the details of the great fight, which was a very

glorious one for the artillery, but its opening phases are especially valuable from our point of view this evening, and it may be confidently asserted that had the German cavalry and horse artillery not thrown themselves with such decision on the foe immediately he was found, Bazaine's army, whatever might have been its ultimate fate, would never have been defeated at Gravelotte, or surrendered in Metz.

As regards the employment of horse artillery and cavalry on the field of battle after the fight has fully developed, although at Vionville the horse artillery remained in action all day, they acted in the general line of guns, and no pedantic distinctions between horse and field batteries were made. All the guns were needed to face the terrible fire of the Frenchmen swarming to the attack with the Chassepôt, and therefore guns did not coöperate in the greatest cavalry fight of the war, when Barby's brigade made its celebrated charge late in the day. Nor do we find them in the other brilliant charges, that of the Brigade Redern, of Bredow, the hero of Tobitschau, that one which the Germans call the "Todten-Ritt," nor during the gallant rush made by the 1st Dragoons of the Guard to stem the French advance, and extricate the guns on the east of Mars-la-Tour. The principle the Germans acted upon is sound, and when once battle is joined cavalry may be used independently of guns, because they are then used in combination with and supported by the other arms, and never assail infantry unless the latter are already demoralized by fire, or taken by surprise.

Nevertheless, there may be occasions when cavalry and horse artillery moving rapidly, even during the progress of a great battle, may anticipate the foe at some decisive point, and may make or prevent a telling flank movement.

The action of cavalry supported by artillery on the head of a column, to prevent a turning movement, was never more brilliantly illustrated than at Rossbach, where Seydlitz made his decisive charge, and the guns on the Janusberg so efficiently coöperated with him. This, however, is scarcely a modern instance, and we must forego enlarging on it. At Gravelotte, however, had the mass of the French cavalry, in place of being held aimlessly and helplessly in the rear, been placed in front of the right of the French position where the ground was favorable to the arm, they might have checked their enemy's advance, and prevented his reaching their right wing till the close of the battle.

It was on this very right wing that the decisive blow of the day was struck, and had the French not been defeated there, the task of the Germans would have been immensely more difficult than it was, for on the left their success was by no means established. Indeed, by a bold and judicious employment of cavalry and horse artillery the French right might have taken the offensive, and, with the Guard Corps thrown in to its support, such a movement must have been an exceedingly dangerous one to their opponents.

An excellent example, however, of the rapid movement of horse artillery and cavalry to assail the flank of an enemy's advance will be found amongst the incidents of the battle of Loigny-Poupry, when the effort of the Army of Orleans to reach Paris was stifled by the Bavarians, on the 2d of Decem-

ber. The details of the battle afford many instances of the mobility of field artillery turned to good account, and it is a battle that deserves attentive study from an artillery point of view.

The 4th Cavalry Division, formed of 3 brigades of 2 regiments each, had been told off to cover the right of the 1st Bavarian Corps, under the command of General von der Tann, which was posted at La Maladerie, facing S.W. The 17th and 22d Divisions of the Germans were moving to the support of this corps on Lumeau and Baigneux respectively, and, in order to join them, Von der Tann was ordered to move into position with his left resting on Château Goury. The French advanced against him from Nonneville, Villepion, and Terminiers, and assailed the Germans while this movement was in progress, and the 2d Bavarian Division was deployed between Beauvilliers Farm and Goury, to resist attack, about 9.30. It will be impossible this evening to go into a full account of all the fighting, but we may say, in general, that the battle swayed to and fro with varying success for the next two hours, the German guns making a splendid stand against the repeated attacks of a numerous hostile infantry. The action of two horse artillery batteries of the 17th Division, which hurried on and came into action to the south of Château Goury just as the French were pressing on impetuously against the weakly held German line between it and Beauvilliers Farm, is very remarkable. The fire of these batteries had a pronounced effect, and checked at once the inroad of the enemy. At 11.30, too, the 4th Cavalry Division, with its two horse artillery batteries, supported by the Bavarian Cuirassier Brigade with a horse artillery battery, also moved round the French left flank, and the fire of the guns caused them to fall back before the Bavarians, and abandon Beauvilliers Farm.

The application of horse artillery, supported by cavalry, was in this case most effective and instructive, and the mobility they displayed in moving across country was very remarkable.

The cavalry and batteries remained till 2 o'clock near La Frileuse, when their commander judged that they might make an even bolder turning movement. One brigade and a regiment were to advance towards Terminiers to cut the line of retreat of the French, the Bavarian Cuirassier Brigade was to sweep round rapidly further to the right, while another brigade was to remain in reserve; the batteries to accompany the cavalry. During the movement both brigades came under fire from French batteries, at the north-west of Faverolles and at Gommiers, and seeing no opportunity for an effective attack at present, the division was halted at Chauveux Farm. One horse artillery battery halted with the division; the other first of all came into action north-west of Nonneville. Having silenced the hostile guns opposed to them, this battery joined two horse artillery batteries which had also followed the movement of the cavalry from La Maladerie, and these three batteries then entered into a vigorous combat with the French guns near Faverolles; one squadron acted as an escort to these batteries. The French guns were soon compelled to withdraw, and then the German batteries went on cannonading the village and the French infantry. At about 3 o'clock several French cavalry regiments from the west of Guillonville made a menacing movement against the German right. The

horse artillery battery at Chauveux Farm at once galloped out to meet them, and greeted them with such a hot fire that they turned and retreated. One of the batteries, also from the south of Nonneville, also moved up to within 1200 m. of these squadrons, and opened a hot fire upon them. A second attempt made by the French cavalry to advance from the east of Guillonville was also repulsed by the fire of these batteries, and to such purpose that the hostile squadrons turned and fled from the field in confusion. The three regiments which were sent forward from the cavalry division to attack these bodies of cavalry were too far off when the French turned to be able to make an effective pursuit, so decisive was the action of the artillery. The batteries, having thus disposed of their antagonists, moved to a position south of Nonneville, from which four batteries cannonaded some French batteries that had again come into action on the south of Faverolles. The German accounts do not stint their praises of the brilliant manner in which these various horse artillery batteries were handled, and especially commend their wonderful mobility, both in moving forward and changing from one position to another. In some cases distances as great as 5000 m. (more than 3 miles) were traversed at a rapid pace across country. The French accounts also tell us how much they were hampered and surprised by the sudden attack thus made upon their flank, and the commander of their 1st Division (Admiral Jauréguiberry) was so completely deceived by the bold onset that he imagined a powerful force was threatening his left. The example is more valuable from an artillery than from a cavalry point of view, for all the honors rested with the former arm, but affords us, nevertheless, a very striking illustration of how mobility and fire effect may be turned to account during the progress of a battle.

Having thus considered the action of horse artillery and cavalry previous to and during a battle, let us turn to examine a rôle which perhaps offers greater opportunity than any other for the exhibition of the special characteristics of these two arms. It is during the retreat after an army has met with grave disaster, as after Königgrätz, or during the retrograde movement before superior forces when it seeks to escape to some securer position in rear, as after Quatre Bras, that a force has to rely for its safety on the efficiency of its cavalry and horse artillery, and it is on these occasions that their assistance is simply invaluable. The Prince de Ligne once said that he could not conceive how an army ever succeeded in retreating. The explanation is that it could never make anything like an orderly retreat before an enterprising foe were its movements not covered with skill and self-sacrifice by the two arms we are dealing with to-night. Perhaps I may be allowed a little license for a moment to refer to a splendid example of this sort when I call to your minds the retreat, on June 17, 1815, from Quatre Bras to the Waterloo position. Wellington had to draw off far inferior forces in the face of Napoleon himself at the head of an army flushed with the victory of the previous day over the Prussians, and looking forward with confident anticipation to a coming triumph over the English, separated as they thought they were from their allies. A series of cavalry and horse artillery engagements was fought that day along the Charleroi road, and we read in Siborne's interesting letters at the end of Lord

Anglesey's account, "Thus ended the prettiest field day of cavalry and horse artillery I ever saw in my life."

This is a typical example of rear guard actions, for in these the object is rather to delay the enemy than to enter into a serious engagement with him, and horse artillery which can move rapidly to successive positions in the rear, fire a few rounds, compel the enemy to deploy, then limber up and gallop off again, is specially suited to such. It should thus form a continual menace to the enemy, most irritating, most impalpable, never allowing him the chance of a direct blow at it, but ever avoiding his onset and slipping from his grasp.

Occasionally, however, when it is necessary to avert total ruin, guns must be sacrificed, and, forgetting their mobility, stand rooted across the path of their foe, blocking his way without thought of yielding. The French in 1870 did not make use of their cavalry and horse artillery either to cover the advance or the retreat; for this reason, and from the nature of the German victories, which we shall deal with later on, we must go back to the war of 1866 to find cavalry and horse artillery sacrificing themselves to secure the safety of the other arms.

In modern war there is no better example of such devoted conduct on the part of cavalry and artillery than the manner in which the Austrian cavalry and artillery staved off complete ruin from their comrades after the great battle of Königgrätz. It is true that these guns which so highly distinguished themselves were not all belonging to horse artillery; but horse and field artillery alike covered the retreat in the manner in which we hope to see horse artillery acting, and all nobly seconded the efforts of the cavalry as though they were linked to them in the orthodox way. Especially did eight batteries of the Reserve artillery distinguish themselves when they were brought into action to oppose the advance of the 2d army under the Crown Prince, and subsequently when they took successive positions to the rear to hold back the triumphant flood of Prussian success. But for the unflinching front shown by these guns up to the last moment the disaster would have been immeasurably greater. Yet, covered by their fire and the brave Austrian cavalry, Benedek succeeded in drawing off his troops, still in formation, across the Elbe, and nothing like a rout supervened on the defeat. These eight batteries lost 9 officers, 139 men, 259 horses, and 32 guns. Let it, however, not be imagined that the loss of guns was a dishonor to them. That idea, I hope, has forever been exploded, and it may form their proudest boast that they sacrificed their guns to save the army.

And on this occasion the action of the Austrian cavalry masses was also worthy of the highest praise. They advanced boldly against the squadrons which the victors sent out in pursuit of their disorganized infantry, and it was due to them also that the shattered battalions were able to escape. Prince Kraft, who was an eye-witness of their deeds, says that had the Austrian cavalry masses not been employed as they were, or had they been absent, the whole Austrian army had been lost, and that had the Prussian horsemen, on the other hand, not been on the field to oppose the hostile squadrons, the result of the day might have been very different, and a victory been converted into a defeat.

Before leaving this part of the subject I cannot forbear to notice how, after the terrible reverse we experienced at Maiwand, the heaviest blow our prestige has received in the East since the Afghan War of 1842, four guns of our horse artillery were mainly instrumental in enabling what was left of our shattered and demoralized force to escape. Their leader was justly rewarded; every one spoke of the splendid behavior of the battery, and some of the men belonging to it were decorated with the Victoria Cross. But what, gentlemen, was the reward of the gallant battery itself of which we were all so proud? Like the other fine battery I spoke of in Egypt, it was broken up. And yet men prate of how *esprit de corps* may be fostered, and the self-respect of the soldier increased! Indeed, this destruction of noble traditions has gone on so uniformly in the artillery that I think it is enormously to the credit of the regiment to which I have the honor to belong that it still preserves its fame untarnished. I once stood with an officer who has now, alas! left us, in the old dining hall at Woolwich. One of the mottoes on the wall emblazoned in old English letters caught our eyes. He read it. "Unlasting yet unresting work." "Surely," I said, "you are making a mistake, it is *unhasting*." "Is it?" he said. "I have remembered it as unlasting all my life, and it seemed such a good motto for a gunner, for it told me that I must do my best, and work hard, and then my battery perhaps would be disbanded." He did not speak cynically. The grey-haired veteran, one of the best officers we ever possessed, had bowed his head all his life to the inevitable, and had never slackened one atom of his zeal or disregarded his duty for one moment, although he knew, and probably had experienced, the reward which too often follows such conduct in our regiment. But his remark filled me with greater admiration for him than ever, and I hope I may tell you with confidence that we have many more like him, whose spirit and energy remains unbroken, even though their batteries may some day be broken up too.

There remains for us now to discuss the duties which fall to cavalry and horse artillery during the pursuit of a beaten enemy. A mere victory will effect comparatively little if the vanquished are not so harassed and demoralized by the victors following rapidly upon them that they shall have no time, as it were, to recover breath. Napoleon blamed his cavalry, after Wagram, for their want of enterprise in this respect, and exclaimed, "This day will be without results," since neither guns nor prisoners fell into his hands to give tangible evidence of his success. Salamanca, similarly, might have been ten times more telling a triumph had a pursuit, swift and inexorable, been launched after the French, or had the Spaniards not broken their pledges with regard to the Castle of Alba. Vittoria, Jena, and Waterloo are examples, on the other hand, of victories converted into routs, although at Waterloo the cavalry might have done more than they did. Instances of ideal pursuits are in fact rare. The best examples, too, are to be found amongst the annals of the early wars of the century. This is variously to be accounted for. Darkness closing in at the end of a hard-fought day too often prevents effective pursuit, and the victors are often too weary and sore for it.

Our force of cavalry was too weak to enable us to pursue after the Alma,

or rather it was supposed to be too weak, for it is useless to deny that a glorious opportunity was then thrown away. The circumstances which surround the greatest victories of 1870 were so remarkable that they rendered pursuit unnecessary. There was, in fact, nothing to pursue, for the entire French army was in these surrounded, hemmed in, or captured. After Woerth, however, the cavalry on the German side was not sufficiently boldly handled, and touch with MacMahon was lost owing to its not having been thrown fearlessly to the front upon his line of retreat. Since we are precluded this evening from going back to what can scarcely be termed modern war for salient examples, we will content ourselves with touching on the principles which should guide us in the future. But let it not be supposed from anything that may have fallen from me just now, that there will not be ample scope and opportunity for the mobile arms in future campaigns to shine in this most essential rôle.

Masses of cavalry should be concentrated on the line of retreat, where the main body of the enemy is most likely to be met with. As many batteries of horse artillery should be sent on with the cavalry as possible, for otherwise a few riflemen or guns may hold the squadrons back by their fire, and it will be advantageous for them not to fight on foot, for every sabre will be needed in the work before them. A German authority,* Captain Cardinal von Widdern, in his "Handbuch für Truppenführung und Befehlsabfassung," recommends that some companies of infantry, well supplied with cartridges, should therefore be sent with them, carried on carriages. The Germans are as you know, no believers in mounted infantry as we organize it, although they clearly recognize the value of a mobile rifleman; otherwise, no doubt, we should have seen mounted infantry proper referred to. The battalion of mounted infantry with our cavalry division will come in most opportunely here, and, we trust, may find a sphere of usefulness before it some day on such an occasion as a British victory. Strong patrols, formed by regiments or squadrons, as circumstances may dictate, would scour the other roads, and smaller detachments would penetrate wherever they could make their way. In all cases the addition of some guns will be extremely useful, for the mere appearance of artillery always produces an immense effect on an enemy in full retreat. The pictures that historians and correspondents have often painted of the disorganized crowds of soldiers jostling one another like sheep in the roadway, the long, slowly-moving ammunition and supply columns blocking up the path, all describe a tempting target to the pursuing batteries, and a few shells may be enough to cause whole miles of vehicles to be abandoned. The defensive power which fire lends to cavalry also gives it greater audacity, and likewise enables it, as we have said, to brush aside resistance which might othewise prove serious; and, finally, the sound of the guns may aid their side, for, in the event of the enemy being able to assemble in sufficient numbers to bring on an engagement, it will call reinforcements in the direction where they are needed. The manner in which our cavalry took up the pursuit after Tel-el-Kebir, although rather in the nature of a cavalry raid, is a splendid example from the most

*Quoted in Trench's "Cavalry in Modern War."

modern times, but the undue weight of their equipment prevented the horse artillery batteries from accompanying the horsemen the following day from Belbeis to Cairo, as Sir Drury Lowe was most anxious they should have done, for, in the event of any resistance being met with in that brilliant and audacious *coup* their presence would have been most valuable.

The mention of this latter feat, for, as we have said, it was more in the nature of a raid than a pursuit, leads us to the last rôle which horse artillery and cavalry may assume in common. I mean in those raids which were a famous feature of the American War, and have ever supplied a field for the energy and capacity of a genuine leader of cavalry. Such rapid enterprises may be undertaken for the sake of gaining information, cutting an enemy's communications, or capturing supplies and stores. We find an excellent example of such an operation in the reconnaissance or raid effected by General Gourko across the Balkans in July, 1877, when in eight days he carried dismay into the heart of Turkey, destroyed parts of the railroad and telegraph on the principal lines, and gained a great deal of information as to the Turkish movements. On that occasion he had a mixed force with him, but there can be little doubt that had he had mounted infantry at his disposal, as the leader of one of our cavalry divisions will in the future have, he would have availed himself of their services. In such rapid operations there is clearly a wide field for the coöperation of horse artillery and cavalry.

During the American War of Secession such raids were freely undertaken, and the exploits of Stuart, Forrest, and Morgan are justly celebrated instances. But these leaders conducted their operations rather after the manner of irregular than regular warfare. Their principal object was to elude observation, not to fight, and, therefore, extreme mobility was desirable. Consequently guns played only a minor rôle, and there was latterly a tendency to dispense with their services altogether. A salient instance of this nature of fighting may be found in General J. E. Stuart's raid in front of Richmond in 1862, when with 1200 men and two guns he unexpectedly burst into the Federal lines, and gained a quantity of information that was of the greatest value in the subsequent operations. With impudent audacity he swept completely round the rear of his opponents, cut their communications, burnt and destroyed a vast amount of stores and property of various description. He returned in 48 hours with the loss of only one man, having captured 165 prisoners and 200 horses and mules. The dashing cavalry leader will probably again in the future thus turn the mobility of his arm to account, and the value of a force capable both of fire effect and rapidity of movement will again be exemplified.

With this last reference to a sphere in which the usefulness of a combination of cavalry and horse artillery will certainly find employment I must close my remarks to-night. I have only had opportunity to touch very briefly on the various aspects of the tactics we have been discussing, but I trust I may have said enough to show you that as much will be expected from the arms of the service we have dealt with in the future as in the past, and perhaps even more. On the battle-field itself, we can hardly

hope to see cavalry, as in the days of Ziethen and Seydlitz, deciding battles by their action, although we may note in passing that the most modern battle, that of Placilla, was won in this way, but before great forces are locked in a decisive struggle, there must be many opportunities for the arm still. Frederick said that for every day of fighting there were twenty of marching, and that is so now as it was during the Seven Years' War. Therefore cavalry and horse artillery should be regarded as the same, for the arm that can move and strike also can never be at a discount, and the side well served by it will reap far-reaching benefits and advantages that will seriously influence the progress of its operations.

TROOPING THE COLOR.

(*From The Navy and Army Illustrated.*)

THE origin of the respect and honor paid to the "Color" dates from the time when the Roman legions marched on their triumphant way, fighting round and under the shadow of their straw-crowned poles, the appearance of which in time to come was universally regarded as the precursor of victory.

The colors of a regiment, properly speaking, are meant to serve as the rallying-points for the soldiers who fight for and under them. In their primary form they were merely handfuls of fern or straw fastened to the tops of poles, and in that shape were carried by the Romans. Julius Cæsar tells us in his account of his battle with the Nervii in Belgium, in 57 B.C., that his men were trained, when separated from their company "color" to rally round the first color they could find, and not lose time seeking for their own.

This handful of straw, *manipulus* in Latin, gave its name to the Roman company of 120 men, which was divided into two half-companies, *centuriæ*, of 60 men each. Three of these *manipuli* formed one cohort, and ten cohorts one legion. Afterwards each cohort had its own standard, the straw at the top of the poles disappeared, and its place taken by some symbol, such as an eagle, a bear, a globe, etc. Later, each cohort displayed a banner made of a square piece of cloth embroidered with its individual device.

Coming to mediæval times we find that the banner changed its shape and became more of the swallow-tailed, or pennon description. As carried by a knight, it was divided into three portions—one containing his heraldic arms, then came his badge or cognizance, and lastly, his crest. This pennon, flag, or standard, then became known as the "color" of the knight.

"Then the Knighte in his colours was armit ful clene."

Anturs of Arthur.

In a curious old book published in 1598 by Richard Barrett, entitled, "Theorike and Practike of Modern Warres," there occurs this passage in reference to what might be called company colors: "We Englishmen do call them of late colours, by reason of the variety of colours they be made of, whereby they be the better noted and known to the company."

There is a sentiment, almost impossible to describe, clinging round the regimental colors; even the phrase *esprit de corps* is somewhat inadequate. Soldier and civilian alike cannot but feel its influence, which is, perhaps, strongest when they see the extreme veneration, the excessive honor and respect paid to the scraps of embroidered silk, for the safety and in the defense of which countless lives have been cheerfully laid down and rivers of blood poured out.

It is difficult for anybody when looking at the faded, torn fragments of discolored flags enshrined in the cool, peaceful quiet of a cathedral or church, to repress the lump-raising, choking feeling in the throat that the sight of the mutilated morsels of the once gayly-waving banner calls forth.

The ever lamented husband of our gracious Queen, nearly fifty years ago, expressed something of this sentiment, which in such an elusive manner defies mere verbal description, when he presented new colors to the Royal Welsh Fusiliers in 1849.

"Receive these colors," he said, "*one* emphatically called *the Queen's*—let it be a pledge of your loyalty to your sovereign, and of obedience to the laws of your country; the *other*, more especially the *Regimental* one—let that be a pledge of your determination to maintain the honor of your regiment. In looking at the one—you will think of your sovereign; in looking at the other—you think of those who have fought, bled, and conquered before you."

Of all the honors which are paid to the color, the greatest is, without doubt, that known as "trooping" it. When this ceremony first became a ceremony, pure and simple, is a matter of uncertainty. The earliest mention of this parade occurs a hundred and ten years ago, and from the description then given, it would appear that the stately attention now paid to the color only occasionally, was then a matter of far less rare occurrence; at any rate, that it took place whenever the regiment had been on parade.

It all depends upon what the ancient writer, Francis Grose, exactly meant by the words "when the ensign returns from the field." At all events, whatever his meaning was, he describes what was evidently the practice in his day, and perhaps for some time before.

Although at the time he wrote, in 1786, a regiment was formed in three divisions—a central division of pikemen, flanked on either side by a division of musketeers, and each regiment carried three colors, Grose does not specify which color was so honored.

However, when the captain led his troops "from the field," and near to the place where the color was to be lodged, he drew up the musketeers in line, while the pikemen took up a position in the rear of the centre of the line. The ensign-bearer, with the color guarded on each side by a sergeant, stood between the two bodies. The captain then marched in front of the color with the drums, and the lieutenant came immediately behind the ensign-bearer, who carried the color furled. The company then "trooped up" to the ensign's quarters, was halted, and the ensign, bowing to the captain, carried in the color. The musketeers thereupon fired "one entire volley," and dispersed to their quarters.

This ceremony was dignified by the term of "this large circumstance,"

and presumably took up some amount of time, for there is another description of the parade which was to be used if time pressed. In this case the whole company was drawn up in a body and escorted the ensign and the color to the former's quarters, and, after seeing the standard safely housed fired a volley and was dismissed.

It was incumbent in those days upon every private and non-commissioned officer to know where the color was lodged, because that place was the rallying point for the company when the "assembly" was sounded. There were then no barracks, the soldiers being billeted about the neighborhood in inns, etc.

It may, therefore, be fair to suppose that the color was trooped each time it was carried back after being had out on parade. But the ceremony probably fell into disuse and was employed only on comparatively rare occasions. It is said, however, that the Prince Regent was in the habit of ordering the manœuvre to take place frequently in the early morning as a test of the sobriety of his officers the evening before; because, unless a man was very steady on his feet, the effect of the slow march of the officers right across the ground to their respective companies, with which the modern "trooping" commences was disastrous. It may be compared to the time-honored test of walking on a chalked line.

At the present time the two colors are trooped only when new ones are presented to a regiment, and it is the old standards which are so honored. But on her Majesty's birthday, the Queen's color alone is paraded. In London the ceremony is performed by the Foot Guards on the spacious parade ground behind the Horse Guards, in St. James' Park, always in the presence of a large assembly, not only of the public but of notable people. The Duke of Cambridge, as Colonel-in-chief of the Grenadier Guards, is usually present, generally accompanied by the Prince of Wales, who often wears the Guards-like uniform and busby of the venerable Honorable Artillery Company, of which he is the colonel. The windows immediately over the archway of the Commander-in-chief's room at the Horse Guards are generally occupied by members of the royal family.

The ceremony begins about half-past nine in the morning by the arrival of the Commander-in-chief of the army, accompanied by the headquarters staff—a magnificent and glittering procession, crowned with a sea of tossing white feather plumes.

The troops, consisting of the Queen's Guard for St. James' Palace and the rest of the regiment detailed to carry out the parade, is drawn up in line facing the buildings, with the Queen's Guard on the extreme right. The color, held by a sergeant and guarded by two picked sentries, usually chosen for their smartness and size, takes up a position in front of the left of the line, facing inwards and fronting the massed bands of the brigade, which forms up on the right of the line. After the adjutant has "opened" the ranks, he hands over the command to the brigade-major, who then inspects them.

The drums then beat the "assembly," marching across the parade, and, simultaneously, the company officers fall in opposite their respective companies on the saluting base, which will presently be occupied by the Com-

mander-in-chief. The brigade-major then calls the battalion to attention, gives the order to fix bayonets, and shoulder arms, and hands over the detail of duties to the field officer of the day, who thereupon takes entire command of the parade.

The company officers then march straight across the ground in line to their companies. It is an extremely difficult movement for the officers to keep in correct alignment and march in a perfectly straight line at a considerable distance apart from each other, and requires a great deal of practice.

The band and drums then play what is known as a "Troop," marching as they play from right to left of the line.

On reaching the color, they countermarch, halt and cease playing. They then strike up a quick march and return to their original position.

The "escort for the color," which is the Queen's Guard, with the "lieutenant for the color" in front of the centre, the sergeant-major, with drawn sword, in rear of the centre file, and preceded by the band playing "The British Grenadiers," moves out, turns to the left, and marches up to and halts in front of the color. The sergeant-major advances to receive the color, and returns to the escort. The lieutenant meets him, takes the color, and turns about, facing the escort. The escort then presents arms, and the sergeant-major salutes with his sword exactly as the officers do, and the band plays "God Save the Queen."

The color is then escorted across the parade; and taken along the front of the line, between the officers and the front rank of the rest of the troops, the front rank of the escort filing between the ranks; the rear rank of the escort filing between the rear and supernumerary ranks of the remainder of the battalion.

The escort and color are then formed up on the right of the line, and the whole body of troops marches past the Commander-in-chief as a battalion in column, first in slow and then in quick time.

The Queen's Guard and color is then marched off the ground to St. James' Palace, where the old guard is relieved, and the rest of the troops return to their duties.

The ceremony of trooping the color is remarkable, if for no other reason, as being the only occasion in peace time when the sergeant-major draws his sword and salutes with it in exactly the same manner as does a commissioned officer.

The parade usually takes place in almost every garrison town in the kingdom on the Queen's birthday, or, rather, the day set apart for its observance; but special brilliance and importance is added to the scene in London in consequence of it occurring in the height of the season.

The ground outside the space kept clear by the sentries is covered with masses of people, while favored holders of tickets issued by the commanding officer of the battalion carrying out the trooping, occupy positions better fitted for viewing the proceedings.

Every window in the large government buildings looking on to the parade ground is crowded with spectators; and the spectacle regarded as a whole from the windows, or, better still, from the roof of the Admiralty, is

imposing, and is not without beauty. The dense, dark fringe of spectators, spotted here and there with ladies' light-colored dresses; the castle-like front of the headquarters of the army, dwarfed by its lofty neighbors, with the large orderly space before it marked out with red dots at regular intervals, and splashed with masses of scarlet; the glittering of the bandsmen's gold lace and shining brass instruments, all combine to make up a pageant worthy to be shown as a rare sight to all men, and one calculated to make an Englishman's heart glow with honest pride as he gazes round at this fitting representation of "England, Home and Beauty."

AMMUNITION COLUMNS AND PARKS, CONSIDERED WITH REFERENCE TO THE REPLACEMENT OF AMMUNITION, HORSES AND MEN DURING AND AFTER AN ACTION.

By Capt. J. F. CADELL, R. A.

(*From Proceedings of the Royal Artillery Institution.*)

TO most questions which may be asked on any military subject we can turn for an answer to the experiences of many wars for some analogous cases; from these deductions may be formed, which should be correct if we can judge rightly as to which side is supported by the weight of evidence, and at the same time see clearly what were the local circumstances of the time causing success or failure. In the present case we have little or no experience in war to refer to, since the ammunition columns and parks as at present constituted are altogether new inventions, called into existence to meet the difficulty which has arisen in supplying troops expending the enormous quantities of ammunition that are nowadays used in a very short time. These troops would be unserviceable without a fresh supply of ammunition, and it is therefore necessary to have a reserve supply immediately to hand. Like everything else in war, the more highly organized this supply is the better. Experience in war does show us that troops well supplied with ammunition have a decided moral and physical advantage over troops less well supplied, but as to how the ammunition from the new columns and parks is to be supplied to troops during and after an engagement it is silent. Our own wars have not been on a sufficiently large scale to allow of an ammunition column being employed and the cause of the existence of these columns is the result of the want which was felt in 1870-71.

The fact that a gun may fire 160 to 180 rounds in a single day's fighting shows that if the gun and wagon taken into action can only carry 110 rounds, the supply is insufficient. Although the average expenditure may be taken at a much lower figure, say 30 to 50 rounds for each day's fighting, a fear has sprung up that the battles of the future will not always be fought

out in one day, and that an action which is temporarily stopped by nightfall may be resumed on the following morning. Whether this is a fear which will be found to be grounded or not is another question, we personally believe that men are either victorious or beaten in one day, and that nightfall will, in 99 cases out of a 100, tell sufficiently on the nerves of the men to make the two or three days' battle less likely with arms of precision than it was in days of less dangerous weapons, and we rather doubt the experience of the citizen wars of America being true lines to go upon, and battles such as the Lisaine cannot be considered typical from any point of view. Be this as it may, it will be an evident advantage to an army to always have ammunition to hand. With satisfactory ammunition columns no one could find any sufficient reason for Bazaine not continuing his retreat on Verdun on August 17, 1870.

Ammunition columns and parks, which are the latest additions to modern armies, have now become an integral part of our army on paper, and as far as carts, harness and stores are concerned a certain number of ammunition columns exist in substance. The parks appear to be still purely paper organizations, and as such even are not very complete in mobilization details.

We have had some experimental practice with an ammunition column with borrowed horses and men at Aldershot, and have tested a battery at Okehampton as to its capabilities for firing away a certain amount of ammunition in a day, that ammunition being brought up, as it would be from the rear, by a portion of an ammunition column. Both these experiments were satisfactory as far as they went, but they tell us very little of what would happen in war as regards the large question we are now treating.

There are some things which are established facts, and the two important ones for our purpose are that an infantry soldier will fire more rounds than he can carry into action, namely 100, in a very short time, and that a gun may fire more than 110 rounds in an action. It is obviously most essential that fire effect should never be lost by troops well placed or in danger, from the fact of wanting ammunition. The infantry soldier is in some respects better off than the gun, because he has a regimental reserve of 85 rounds per man carried regimentally, but his expenditure in exposed positions is almost without limit. The supply of the infantry soldier in the fighting line is, however, not our business. It is a task that has baffled many deep-thinking soldiers, it is at present arranged for regimentally, and must of necessity be done in this manner. The ammunition column only comes in as a supply to the regimental reserve in every case, for in the artillery the wagons may be treated as a first reserve to the gun and limber, although they often may be emptied first.

In large wars, where large masses of troops will be engaged, we have arranged that with the army there shall be an ammunition column to each division and one to the corps troops of each army corps while there is also one to each cavalry brigade. There are at present the nuclei of four cavalry brigade ammunition columns, nine division ammunition columns, and three corps troops ammunition columns. These ammunition columns, which form the second reserve of ammunition, carry 77 rounds per rifle,

and 74 per gun and 24 per pistol in the army corps, and a reserve of 20 rounds per carbine to the cavalry attached to the divisions. Behind these there marches after each army corps a third reserve of ammunition, which is called the ammunition park; this is divided into five sections, the first three being for the supply of the three divisions, the fourth for the corps troops and the fifth for the cavalry brigade. The ammunition park carries 60 rounds per rifle, and 72 rounds per gun in the army corps.

The general principle which is laid down for the supply of ammunition in the field is that the firing man or gun is supplied by the first or regimental reserve as far as possible at the beginning of an action, so that they may be able to retain their personal supply intact as long as possible. This first reserve is for the infantry, the regimental small-arm ammunition carts and mules, for the artillery, the battery ammunition wagons, for cavalry, the regimental ammunition wagons. As soon as this reserve has expended any ammunition it should supply the loss from the ammunition columns, these in turn obtaining what they expend from the ammunition park. The ammunition park will be kept full from the ordnance store depot, which will in all European countries be closely connected with some railway.

The next point which we must notice is one which is stated in our regulations, or perhaps more correctly in the books that are printed for the instruction of officers; it is that the ammunition columns move a mile or so behind the divisions or army corps, and the ammunition park nearly a day's march behind these, say about nine or ten miles. As to how the supply is to be actually carried out these books are silent, probably for the very good reason that there is no experience to guide them, and that in the ever varying conditions of war there are so many possibilities that it is better to trust to the common sense and initiative of the men on the spot, than to hamper them with orders which it would probably be impossible to execute, and which might be the very worst for the actual case in point

The first principle of supply which we have stated is clear enough. The fighting unit must have full pouches and boxes, the first reserve must see to this, while each reserve in rear supplies the deficiencies of those in front. There is no hidden secret as to how this is to be managed, but clear heads will be necessary to prevent waste of force, and what is equally important, waste of time.

Having thus emphasized the general duties of the ammunition columns and parks, it may be well to give in the form of a table their constitution, and also to state what they carry, before we go into the details of supply in the field. This will, to a certain extent, help us to show what they will have to supply and what they will probably have to send away during an action.

It is believed that the recent change which added a subaltern to ammunition columns did not apply to the cavalry brigade ammunition column.

From the tables it will be seen that all ammunition columns are commanded by a major. They are subdivided into sections, the larger columns into three sections and the cavalry brigade ammunition column into two. No definite orders have as yet been issued as to how this subdividing is to be

TABLE A.

AMMUNITION COLUMNS.

RANKS.	"Personnel"			Horses.					
	Inft. Div.	Corps Troops	Cav. Brig.	Inft. Div.		Corps Troops.		Cav. Brig.	
				R	D	R	D	R	D
Majors	1	1	1	1*	..	1*	..	1*	..
Lieutenants	3	3	2	3	..	3	..	2	..
Sergt. Majors (W.O.)	1	1	1	1	..	1		1	..
Batt. Sergt.-Majors	1	1	1	1	..	1	..	1	..
Batt. Q.-M.-S's	1	1	1	1	.	1	..	1	
Farrier-Sergts	1	1	1	1	..	1	..	1	..
Sergts	6	6	4	6	..	6	..	4	
Shoeing Smiths	5	5	3	1	..	1	..	1	.
Collar-Makers	3	3	2	..	..	..	..	..	..
Wheelers	3	3	2		..		..	..	..
Trumpeters	2	2	2	2	..	2	..	2	..
Corporals	6	6	4	4	..	4	..	4	..
Bombardiers	6	6	4		..				
Gunners	48	42	28	..	..		..	..	.
Drivers	110	104	51	..	182	..	172	.	74
Spare	..	..	..	3	14	3	12	3	8
Totals	197	185	107	26	196	26	184	22	82
Grand Total Horses.	..	..		222*		210*		104*	

* One private horse.

TABLE B.

VEHICLES AND HORSES AMMUNITION COLUMNS.

NATURE OF VEHICLES.	Vehicles.			Draught Horses.		
	Inft. Div.	Corps Troops	Cav. Brig	Inft. Div.	Corps Troops	Cav. Brig.
Spare gun carriages	1	4	1	4	16	4
Carts S. A. A	10	2	8	20	4	16
Wagons — Ammunition with limbers 12-pr.	6	10	6	36	60	36
Wagons — A. and S. — For gun ammn	6	10	..	36	60	..
Wagons — R. A — For S. A. A	11	2		66	12	..
Wagons — R. A — For stores	1	1	1	6	6	6
Equipment, supplies and reserve rations	2	2	1	8	8	6
Forge with limber R. A	1	1	1	6	6	6
Spare	..	..	..	14	12	8
Totals	38	32	18	196	184	82

done, it would, however, appear to be advantageous to divide the columns in such a manner that one subaltern should have charge of infantry ammunition, another gun ammunition, and another the stores and supplies, etc. The objection to this method of subdividing the column is that a section cannot be detached conveniently as it stands, but it does not appear to be advisable to divide the column, beyond the despatch of a few particular

TABLE C.

AMMUNITION PARK.

Sections	"Personnel."			Horses.					
	1, 2 and 3.	4	5	1, 2 and 3.		4		5	
RANKS.				R	D	R	D	R	D
Officers	3	3	3	3	..	3	..	3	..
Sergeant-Major (W. O.) } Staff Sergeants }	3	3	3	3	..	3	..	3	..
Farrier-Sergeants	1	1	1	1	..	1	..	1	..
Sergeants	5	4	4	5	..	4	..	4	..
Shoeing-Smiths	3	3	3	1	..	1	..	1	..
Collar-Makers	2	2	2	..	..	..	..	..	..
Wheelers	2	2	2	..	..	..	..	..	..
Trumpeters	2	2	2	2	..	2	..	2	..
Corporals	4	3	3 }	4	..	3	..	3	..
Bombardiers	4	3	3 }						
Gunners	36	32	26	..	..	..	..	..	..
Drivers	91	78	60	..	150	..	126	..	90
Spare	..	..	..	2	14	3	10	3	10
Totals	156	136	112	21	164	20	136	20	100
Grand Total Horses	..	..	..	185		156		120	

TABLE D.

VEHICLES AND HORSES AMMUNITION PARK.

Sections	Number of Vehicles.			Draught Horses.		
	1, 2, 3.	4	5	1, 2, 3.	4	5
NATURE OF VEHICLE.						
Wagons A. and S., R.A., 6 horse	22	18	12	132	108	72
" " " " " 4 horse	3	3	3	12	12	12
Forge with limber, R.A.	1	1	1	6	6	6
Spare	..	..	..	14	10	10
Totals	26	22	16	164	136	100

wagons to some given point where required. Even this should not be done when it can possibly be avoided.

The ammunition park, which is constituted as follows, has a staff of its own, lieut.-colonel, adjutant, veterinary-surgeon and medical officer.

The ammunition columns actually carry the ammunition mentioned above, and also a certain number of spare wheels and shafts and other materials for repair. Though these latter would to a certain extent be necessary for the preservation of the column in the field, it will certainly be called upon to supply these stores to the batteries in front of it, which will most assuredly suffer more severely than it does itself. The spare gun carriages, wheels and shafts are, however, articles which the ammunition

columns can supply without loss of efficiency in itself. This is a point to be borne in mind though it is not of paramount importance.

The next point we must touch upon is the question of how these ammunition columns and parks fit into the chain of command of the fighting units. The divisional ammunition column is directly under the orders of the lieut.-colonel commanding the artillery brigade-division in the division. He will usually receive instructions limiting the position of his ammunition column from the general commanding the division. It is, however, obvious that when the lieut.-colonel is fighting his batteries, orders will often have to be sent direct to the officer commanding the ammunition column from the divisional headquarters. The lieut.-colonel should receive information as regards these orders from his subordinate whenever possible. In the corps troops ammunition column the colonel commanding the corps artillery will give all orders as regards the disposition of this ammunition column, subject of course to limitations given in the orders he may receive from corps headquarters. The officers commanding cavalry brigade ammunition column will receive all orders direct from the officer commanding the cavalry brigade. There can be no other intermediary, but corps headquarter orders will often over-ride his decisions and will very often dictate to him exactly where the column must march, immediate attendance on the brigade being quite impossible. As regards ammunition parks, each being commanded by a lieut.-colonel, is an independent command and receives its orders direct from the corps headquarters through the officer commanding R. A. who is on the staff of the army corps.

Having stated the constitution and position in the army corps of the ammunition columns and park, we can now, taking an army corps as our unit, study their duties, positions and probable movements in action. It may be taken as an axiom that an army will be fighting one of the following three classes of battles, and that this will have an influence on the general conduct of the ammunition columns and parks. These are, as everybody knows:—(1) The defensive action, which must be subdivided into two heads. (1*a*) The army corps having taken up a defensive position to meet attack, in which it intends to fight to the last, and:—(1*b*) The rear-guard action. (2) The offensive action, in which an enemy in such a position as (1*a*) is being systematically attacked. (3) The unpremeditated action, where two opposing armies meet on the march and fight very much as they happen to come up.

It is self-evident that the rôle of the ammunition columns must be very different in each of these cases, and that different orders will have to be given in each case. We will first consider the position in action which would probably be the best for the ammunition columns and parks in each of these cases. (1*a*) Here much can be arranged beforehand. Everything depends on bringing a continuous fire on the enemy from the moment that his columns come into sight until the time when he delivers his final attack. It will be reasonable to suppose that in a defensive position there will be cover available at no great distance from the fighting line where the ammunition columns can be parked. These positions can be clearly shown to the troops engaged. They should be near a road or, if possible, two or more

roads leading to the front. Two openings should be made in the fence if the ammunition column is parked in an enclosed field; one for empty wagons and carts to come in by, and the other as an exit to the front for full ones; the rule of the road being observed in the selection of these openings to prevent any crossing of wagons and carts. Some light guide posts should be placed showing the way to the ammunition columns, each of which should bear the number and designation of the ammunition column. It is obvious that the position selected should be as close to the troops engaged as is consistent with comparative safety from fire, and the fact that in case of retreat the ammunition column may be able to get out of the way and escape capture. A distance of a mile should in such a case be amply sufficient unless there is some natural defile behind the position which would cause the column to be very much exposed had it to retreat over or through it. In this contingency, if not too far distant, the further side of the defile would appear to be a good place, but the distance should not exceed two miles. The park, can in this case, be advanced to from five or six miles from the ammunition columns to facilitate the filling of the latter, as there will be no immediate danger of its crowding roads which should be quite clear of troops, these being already all concentrated at the front. If, however, any rear-guard position has been selected in the event of defeat, the park should be behind this.

In case (1*b*), the rear-guard action, the ammunition column will have no place near the fighting line, as no position of this kind can be safely held after the enemy has once fully deployed for attack, the object of taking up the position then having been gained. The ammunition columns should be at the head of the retreating main bodies; they should take advantage of any halt to fill up any empty regimental reserves which can reach them, but it is doubtful if much can be done beyond leaving wagons and carts in reply to a demand from the fighting units. The ammunition park would in this case be sent as far to the rear as possible in order that it may in no way impede the rate of march of the columns, or embarrass the general in command by his having to take precautions for its safety. Any supply required from it should be left behind, and the wagons carrying this could rejoin the park at an increased pace when empty. As, however, in retreat the object is to get beyond striking distance of the enemy, all delay in the movement of the ammunition columns and parks is to be avoided.

In case (2), the fact of an attack on a position presupposes a certain definite superiority on the part of the attacker. This will allow the ammunition columns of the troops destined for the attack to be close to them. The columns will probably be parked in the first instance, but this should not prevent them from advancing on definite lines, to support their units with fresh ammunition at the important juncture. As in the initial stages of the attack the troops engaged will be a very long way from the enemy, everything has to move forward and the supply of ammunition in rear must move forward too, or the distance between the ammunition columns and the troops they have to feed will become very great, and that worst of all situations may arise, of troops having attained a position from which an

effective fire can be delivered only to find themselves without the necessary means of offense. From this it would appear that in the attack a line of road would be a better situation for an ammunition column than any given spot. This of course will not prohibit the officer in charge from forming up in a field where he sees a chance when he cannot safely advance further and here making the necessary entrances and exits. The officer in charge of the ammunition column will have to ascertain for himself any change in the direction of the line of attack of his unit and conform to its movements as far as possible, always informing the officer in command of the unit of any deviation in direction that he has made from that already dictated to him. In this case it may be taken as a certainty that the ammunition columns will be at least two miles in rear of their units at the beginning of the day, and that if a march has to be made prior to the attack that the distance will at times be considerably increased; but this should not prevent them from closing up to a mile in rear of the troops when these become engaged.

The park will be at the beginning of the day at the normal distance from the ammunition columns, it should close up during the fight to half that distance. The sections always informing their respective columns as to their ultimate destination if the whole park does not move together. The position of the park will be more or less defined by the general officer commanding the army corps, and his orders will probably prohibit an advance beyond some clearly defined line.

In case (3), that is to say, an army moving within striking distance of an enemy who is also on the move, much must be left to the development of events. In the first instance the normal position on the road will be occupied by the ammunition columns, and they should not close up or shorten this interval without definite orders, when the troops in front halt and deploy, and it is clear that an engagement of a serious nature is going to take place. It would, indeed, be probably advantageous to have the normal distance somewhat increased, to say three miles, as armies on the move may not meet with any great exactitude and ammunition columns close up to the fighting troops might be found to be very much in the way and impede the manœuvring power of the troops. They might have to retreat and would then block roads on which other troops were advancing. There will be no disadvantage in the ammunition columns being further to the rear, as the preliminary stages of the action will always give ample time to make good any lost ground. It is possible that, for tactical reasons, divisions may have to be moved across from one flank of a line of battle to another in this case, and the advantage of having ammunition columns well to the rear is then very obvious, as tending to diminish the confusion which such an undesirable movement is certain to make, when it has to be done. In this case the parks will move a full day's march in rear of the army.

The above considerations are not exactly the supply in the field, but without first fully investigating where the ammunition columns will probably be we cannot define a line of action for them and decide what they can and should do. We now see that they can be of most immediate use

in case (1*a*), and least in case (1*b*); while they have certain advantages as regards initial positions in case (2) over case (3).

The point that an officer in charge of an ammunition column must have clearly before his eyes is that without efficient troops in front of him, he is useless, and that therefore he must never take into account the efficiency of the ammunition column in such points as men and horses, except as regards the small-arm ammunition section, as compared with the efficiency of the service and teams of the guns. It is, of course, obvious that the infantry must not lose their means of offense because the guns have suffered; but with regard to the rest, it is better that every wagon of the ammunition column should be left in any field, than that a single gun in the fighting line should be incapable of movement, or defective in fire effect. He in turn (the officer commanding ammunition column) will receive horses and men from the park which will be supplied from the depots and horse depots; there may, of course, be some delay about the arrival of these reinforcements, but there must never be any delay in the supply to the front from the ammunition columns in case of need. It is, perhaps, superfluous to emphasize this point, but any officer in charge of a unit is apt to think first of the efficiency of his own command, which he sees, and thus neglect the only cause of his existence, which in this case is to make the fighting portion of the army efficient. It is often so hard for us to bear in mind the general good, when a clear and visible personal disadvantage stares us in the face.

We will now consider what a divisional ammunition column can and should do during an action and after an action, after which we will treat the corps troops ammunition column and cavalry brigade ammunition column. We select this order so that we may take the more comprehensive first. We will first take the simplest case (1*a*), that of a divisional ammunition column parked in a convenient situation behind its division, which forms part of the line in a defensive position. We will suppose that the enemy is making a methodical frontal attack—modifications will have to be made for those of flank divisions, or divisions held in reserve; with these latter the columns will have to act very much as in case (3). In case (1*a*), we may presume that the first demand will be for artillery ammunition, empty wagons will come in from the front as the artillery duel progresses, some of these may be short of horses, but this is not very likely as in such a position as we are at present considering the teams can usually be well protected by the ground. The wagons and wagon limbers which come up should be inspected as soon as they arrive in the field where the ammunition column is parked. The officer in charge must make up his mind at once as regards what changes in horses are necessary. Time here is always an important factor; that lost on the road is the result of circumstances over which he has no control, but any hesitation as to what is to be done in his command will cause avoidable delay. The orders of the officer in charge must be concise, he must state to what section each individual vehicle is to go, and tell the subaltern officer in charge of the section whether the wagons are to be refilled and returned or simply exchanged. If refilled, the limber and wagon should be drawn up close to an

A. and S. wagon in which the packing cases have already been opened and two men set to refill each box; if exchanged, the teams should be immediately unhooked and hooked again into one of the full ammunition wagons of the column, the kits of the gunners being transferred from one wagon to the other. As soon as each consignment of wagons is ready, it should be immediately despatched to rejoin its unit at the front. The empty wagons which are left behind should then be filled from A. and S. wagons of the column, and made ready in every respect to go to the front again. As soon as three A. and S. wagons are empty, they should be despatched under the charge of an N.-C. officer to the ammunition park; any loss in horses can be made good by sending these to the rear under horsed, or with horses that have suffered from the effects of the campaign, as it may be possible to replace them at the park. Wounded horses which can travel should be sent with this detachment. No seriously injured horse should ever come to the ammunition column, as these are not worth their food, and should be shot when they are disabled. Horses which are sent to the rear may become fit for work again at the horse depots; they are only a useless encumbrance at the front. The front is the hardest place to feed anything, and no temporarily useless animal should be kept there.

S. A. A. carts will also arrive at the ammunition column empty from the front. These should be sent direct to the officer in charge of the infantry ammunition section, who will cause the horses to be unhooked and, if fit, immediately hooked into full S. A. A. carts, the empty ones being placed beside an A. and S. wagon and refilled by the men of the ammunition column. Should carts or wagons come back a second time to the ammunition column they should always be exchanged as far as possible with carts or wagons belonging to the unit from which they came originally to avoid confusion.

As the day wears on and the critical phases of the action are reached, the officer commanding the ammunition column will probably find that one of two alternatives lie before him; either his army has been successful in resisting the attack and will require all the aid that he can give it to render it efficient for a forward movement at once or on the morrow; or that there are evident signs of defeat, confusion and retreat. If success appear to be probable, he will quietly continue his action of supply as in the earlier part of the day, until it is evident that the last effort of the enemy has been made and has failed, or that a successful counter attack has been made by his own people. Then it will be his duty, failing the receipt of orders, to ride forward to the brigade division he supplies and find out from the officer in charge what he can do to replace deficiencies in men, horses and matériel (gun carriages, wheels, etc.); at the same time sending the subaltern in charge of the infantry ammunition section to the officers commanding the brigades to collect reports as to the amount of ammunition required. When this has been done, the officer commanding divisional ammunition column should send forward all that is required which he can supply, and remove all damaged articles that his artificers can make serviceable again. All useless articles being thrown away as no useless extra weight should be carried, especially as it must be borne in mind that

the haulage power of the horses in the command generally will have been to a certain extent reduced. This can be made good, to a certain extent, by repeating the former action of sending empty wagons to the rear with two or four horses. At the end of a successful engagement the supply should be done entirely from the rear to enable the fighting units to recruit to the utmost the energy necessarily expended in action. In retreat, however, the case is different; the fighting energy has gone out of the men and the best hope of recovering it lies in getting beyond striking distance of the enemy as quickly as possible, so everything must be done to conduct a rapid and, if feasible, an orderly retreat. To attain this, it is clear that a most arduous duty lies before the officer commanding the ammunition column when he sees that the retreat of the troops covering his front is inevitable. Clear roads are essential and it is therefore his duty to retire, but an ill-advised retreat is the worst error he can commit. To prevent this, he will, when he first feels that things are going badly, send all his less mobile wagons on to the road and retire them a mile or so at a walk, with distinct orders where to halt and await the development of events, while he himself should wait with the ammunition wagons, the S. A. A. carts and spare horses in his original position until he sees that retreat is inevitable, or receives orders from the general commanding the division that such is the intention. He should then send all spare horses to the artillery in charge of a subaltern and rejoin the portion of his column he has sent to the rear at a trot, after which he will put as much space between himself and the enemy as is compatible with keeping touch with his own division. The whole of his action under these circumstances will require a very cool head and clear judgment; to retire when he can still be of any possible use to the troops in his front would have a deleterious effect upon them besides being unsoldierlike, while he may also do infinite harm if he remains too long and causes thereby more confusion than that which is always inseparable from defeat and retreat.

In the case of a division on the flank of an army the position of the ammunition column will naturally be as far from the exposed flank as possible, and the lines of supply and retreat should be arranged accordingly. They should be covered as far as possible by natural screens. The officer commanding this ammunition column should be kept informed of outflanking movements of the enemy. His duties will be the same as those of other divisional ammunition columns, but the outflanking movement of the enemy, should he not be covered by a natural obstacle, will cause him to make preparations for retirement earlier than otherwise would be the case.

The action of an ammunition column of a division held in reserve will vary with the circumstances. Should the whole division be held in reserve the action will be similar to case (3), which will be treated later. Should the artillery be in action while only the infantry is held in hand it will be necessary to make a division of the column, the artillery ammunition section, or a portion of it being sent to the divisional or corps troops ammunition column which is nearest this artillery. When the infantry is brought into action a certain number of S. A. A. carts should be sent to the ammunition column nearest to this infantry. It will always be easier to find an

ammunition column than a detached portion. As far as possible, the supply of the division should be carried out by its own column, not to place an undue strain on the other columns which will have been already more severely taxed. The headquarters of this ammunition column must be well in rear. All empty wagons must return to this to be despatched to the park, and the officer commanding must let no details out of his control or there is bound to be confusion.

The position of corps troops ammunition column is behind the corps artillery. The action is similar to that of the division ammunition column, only that the infantry portion will require little attention. Should the corps infantry battalion be detached it should be supplied from the nearest ammunition column and no detachment made from this ammunition column.

The cavalry brigade ammunition column must be kept well to the rear; cavalry will almost invariably bivouac behind the infantry. To supply this very mobile arm while in action is hopeless. Supply must be carried out after it has been in action, and if possible from the rear. The nature of the country, position of the enemy and the special orders given to the brigade may dictate to a certain extent to which flank this ammunition column should be inclined; but it would appear that behind the centre would be the best place, or, perhaps on the main road. The supply after the action should be similar to that of divisional ammunition column.

When we consider how much has to be thought of in the most simple case of an army in a defensive position, we feel how very difficult must be the task of the officer commanding an ammunition column where very little is arranged beforehand as in the case of the attack. Again we will consider the simplest and most comprehensive first, namely, the division ammunition column. It may be supposed that reconnaissance has discovered the limits of the position, and that the attacking army has extended or contracted its front to a somewhat similar extent; that is to say, that circumstances exist more or less similar to those of the French army on the second day of the battle of the Lisaine. We will not assume, however, a "moral" similar to that of the French, or that the extreme weather exists, or that the country is so deficient in roads, as under these conditions ammunition columns will be able to do little or nothing on either side during an action, being of necessity too far to the rear.

As we have previously stated, the ammunition columns will be further to the rear in this case at the commencement of the action than in that of the defense. The roads will be blocked to a certain extent by troops, and cannot be perfectly known. The general line of advance of each division will be known, and the artillery will make known the position it has taken up by the sound of its fire—until this happens there can be no need of ammunition columns.

The officer commanding an ammunition column will thus gather where he has to go in the case of a division forming part of the frontal attack. He must close up as the action begins to about a mile in rear of the guns, selecting a position, sufficiently sheltered, where he can be easily found. He must inform the officer commanding the brigade division, R.A. of the posi-

tion he has selected, and having parked his column, should proceed to supply artillery ammunition, as in the case of the defense. He can do little to supply the advancing infantry, as they will be a long distance in advance. Empty carts may come back and should be immediately exchanged for full ones and despatched. But little can be done to supply attacking infantry until it takes up an effective fire position, such as advocated by V. Hoenig for the attack on the line Moscou-Point de Jour from Gravelotte. In such a position carts could proceed to the wood or other cover in rear, and mules and ammunition bearers could do something to feed the fighting line from thence at great cost and danger—but even this could scarcely influence the ammunition column. What can be done must be done, but all that the ammunition column can do is to replace empty carts and refill those sent back. The officer commanding must not press any portion of his command forward into the zone of artillery aimed fire and the carts of the infantry will only seldom reach him. He can, however, keep the artillery ammunition wagons full, so that when the artillery advances it may have full boxes everywhere to start with. As the critical phases of the battle approach, he must wait ready to follow a general advance, but it will scarcely ever be advisable for him to advance until the position is crowned. He may have to send teams to get guns out of action in exposed positions, but it will usually be better to leave guns where they are, unless there is not sufficient power of resistance left in the attack to meet a counter attack, and all this he can scarcely know, and can only act in obedience to direct orders received.

Should, however, defeat and retreat appear certain, the officer commanding the ammunition column must take steps to retire; action similar to that above described for retirement will apply here also. In the event of a distinct success, the ammunition column must be brought up at once to the fighting troops, and everything possible done for them. They must rest and should not be asked to work.

A division making a flank attack cannot be supported during the attack; this is of the nature of a sudden effort and the ammunition carried regimentally should always suffice.

The corps troops ammunition column will act in a similar manner to the divisional; it can, however, only attempt to supply artillery during the action. It can send assistance to whatever column is by force of circumstances obliged to supply the corps battalion should it be engaged. This is, however, a very small portion of its duty.

The cavalry brigade ammunition column will remain in rear of whichever flank of the corps the cavalry brigade may be acting. Regimental carts and some of the artillery ammunition wagons will probably stay with it. These can go to the front to supply the brigade when it is inactive, which will be always during a considerable portion of the engagement. As cavalry in action is nearly always behind the infantry the supply of this arm is simple. It will of necessity have to find its ammunition column and make its demands, as the column cannot move about to suit the continually varying position of the cavalry brigade.

Here the ammunition columns, of whatever nature, can only take part

during the action when the preliminaries are over, and, as a matter of fact, one of the two previously described cases has been assumed by the army in question.

The columns will of necessity have to come up some distance from the rear, but must park further off than in either of the above mentioned cases, so as little can be definitely known of what is going to take place, that their presence close up would be a grave danger. Troops may have to be moved from one flank to another—nothing can be considered as settled. A general uniformity of movement at a respectful distance is all that can be dictated, most careful reports of these movements being always sent forward, unless specific orders are received. When in this case an ammunition column is finally parked, the work of replenishing loss will be more arduous than in the previous cases, as it is certain to be more or less late in the day, while, from the nature of things, the losses in horses and drivers will probably be greater than in the other cases, as cover cannot be so well utilized on imperfectly reconnoitred ground. The system of supply will be similar, but the actual work more straining. The extent to which the ammunition columns may have to sacrifice their mobility and their existence must know no bounds.

In this case it may also be sometimes advisable to leave some of the A. and S. wagons with both artillery and infantry ammunition some four or five miles in rear, only taking forward a limited quantity, but all ammunition wagons, S. A. A. carts, means of repair, spare gun carriages and spare horses must go to the front. The rear portion can be called up as the situation develops, and, in case of a rapid defeat, the loss will be minimized. In the event of success, the officer commanding ammunition column will act as described in case (1), the night after the battle being for him the most busy time. Every nerve must be strained to complete the infantry and cavalry in ammunition and horses for their regimental transport, and the artillery in ammunition, horses, stores, equipment and men. The distances which will have to be traversed and the difficulty in finding mixed up units being both greater than in the previous cases, the completion of this task will take many hours from the night. When all is finished, the ammunition columns must themselves be inspected, a convoy of empties sent to the rear and demands on the park made out, with a return of the ammunition expended.

The parks generally, moving as they do from seven to fifteen miles in rear of the army, are not able to independently do much for the ammunition columns. They have to supply demands as they arrive, and in turn fill up their own deficiencies. It may often be found possible to use local country transport when the park becomes deficient in mobility owing to demands made upon it. The same principle must be borne in mind as with the ammunition columns; that so long as the ammunition columns are complete it does not signify to what extent the park has to suffer; a perfect park is useless unless the columns in front are supplied. The efficiency of the park must come from the rear, and not be secured by the sacrifice of the troops in front.

All issues of ammunition, stores, etc., should always be noted in writing

and, if possible, receipts received, a simple form being used during and after action. A pocket-book of waterproof paper ruled thus would be convenient:

	Receipt.	Delivery Note
Issued at..... Time.. ... ...3.15 p. m. Date.....27. 2. 96.	Received from O. C. 5th Div. Amm. Col.— 2 Amm. wagons complete.	Issued by O. C. 5th Div. Amm. Col.— 2 Amm. wagons complete.
To order of Lieut.-Col Smith— 2 Amm. wagons complete.	T. Atkins, Q.-M. Sergt., R. A.,	A. Grey, Lieut. R. A., 5th Div. Amm. Col.
N. B.—Received two empty wagons with small stores.	27. 2. 96. 47th F.B.	N. B.—Received 2 empty wagons with small stores. A. G.

All question of complicated and bulky receipt and delivery vouchers are entirely out of place, but so long as no time is lost, much inconvenience in adjusting accounts will be saved by a simple book. Unless accounts are of the most simple in war, they will not be kept at all, as anybody can lose a book. That they would be useful is certain, and a rough and ready system would answer all requirements.

The key to handling an ammunition column well in the field is like everything else in war—the possession of a cool head and the faculty of telling by the signs of the times what is the exact state of the fight in front. The officers commanding must always be prepared to sacrifice their commands to any extent to assist the troops in front; but to do this well and at the same time to do their duty to their commands, they must always have both eyes wide open, and be prepared to act calmly and at once under all circumstances.

Military Notes.

MILITARY PROGRESS IN 1895.

COLONEL HILDYARD has again placed British officers under an obligation by making a *précis* of Löbell's annual reports on military change and progress during the past year. The *précis* appears in the *Journal of the Royal United Service Institution* for August, and occupies about fifty pages. It cannot, of course, be said that all the information supplied is entirely new, for much of it has already been gleaned from the pages of home and foreign military papers. At the same time these reports are unrivalled for comprehensiveness, trustworthiness, and the judicious arrangement of the latest facts connected with the principal armies of the world. Perhaps the most interesting item noticed in the German army is the formation of bodies of *meldereiter*, or mounted orderlies. These are intended to perform the orderly, patrol, and despatch-carrying duties, which hitherto have withdrawn so many men from the divisional cavalry. Each detachment consists of 108 horsemen under the command of a captain, and all must be good cross-country riders, judges of distance, must know the principles of reconnaissance, and be able to make a clear and concise report. The peace strength of the German army for 1895 was 547,337 of all ranks, and that of the French 573,142. Under the head of Austria-Hungary, it is said that since 1894 the details in regard to the war strength of the troops have been kept secret. The post held by the late Archduke Albrecht has not been filled up, the appointment of Inspector-General of Military Educational and Training Establishments has been created, the Landwehr has been reorganized, six through lines of railway are now open for a concentration in Galicia, and a Ministry for Railways was to be created in the beginning of 1896. Considerable space is devoted to the Russian army, the peace strength of which is given as 893,900. Here also detachments of mounted orderlies have been formed during the past year. The regular cavalry has been increased, so also has the field artillery. In the latter arm the brigade, consisting of six batteries of eight guns each, has been broken up into two divisions, an arrangement which is less unwieldy "for use in the field as well as for instruction and command." Among the other armies reviewed are those of Italy, Belgium, Greece, Switzerland, and the South African Free States.

According to the Löbell reports, there was an overwhelming majority in the German army for some years prior to 1893 in favor of abolishing the corps artillery and distributing all the artillery among the divisions. In 1893 and 1894 the interest in the rearmament of the field branch superseded that in its organization, but in the course of 1895 the latter question was

again brought forward. "That the organization as it exists cannot continue," says the artillery writer, "is the unanimous opinion in the field artillery. Apart from the fact that regiments of twelve, even thirteen, batteries are much too big to be managed and trained, the formation only on mobilization of the corps artillery regiment is an evil not to be found in any other arm." With reference to the preparation by artillery of the infantry attack on fortified positions, we read that "whereas Germany and Austria would solve the question by special projectiles, in Russia and France mortars have been adopted." Then follows an estimate of the advantages and disadvantages of employing mélinite. The effect of the French shell is said to be due not so much to its splinters as to "the pressure of the air caused by the explosion, which would cause serious internal injuries to men and horses in the vicinity." It is, of course, the object of the gunner to combine power and mobility, two qualities which militate against one another. In peace the tendency is to strive after the latter, while it has been found that during and immediately after war greater importance is attached to effect. The ideas which prevail in war seem to be steadily kept in view by the French, who have now got a weapon "not only greater in weight than any other European field-gun, but that, further, far exceeds the limit of weight hitherto recognized as permissible." The section on artillery, which concludes with a discussion of the horse artillery rôle, shows that the definite settlement of great questions in this branch is still rather far off. It is, however, not so with the cavalry. The regulations of 1895 put an end to the conflict which had raged around this subject. The ruling principle that no formations should be retained, if they are not available before the enemy, has had the effect of simplifying and shortening the official instructions, but a new chapter has been added to them on the cavalry fight. In this, high aims are presented, the attainment of which is clearly and concisely described, and energetic action at all times is inculcated. The cavalry has now been "officially given an honorable rôle, and a decisive coöperation is anticipated from the masses formed of combined divisions operating under a united leading."

The writer on infantry tactics in Löbell's annual reports says that the German regulations allow the widest scope in regard to tactical action, and hence the keenness of the controversy between the advocates and opponents of "free procedure." The substance of the controversy, it is said, would be better expressed if the term "attack under normal conditions" were substituted for "normal attack." The independence of subordinate leaders must be strictly limited in order to insure the unity and coherence of the attack, because experience of war has proved that looseness and want of connection are the "mortal enemies of tactical success." On the subject of supports the writer says that "the soldier can only advance directly when under fire, and therefore the regulation fan-like extension of the support may do very well on the drill ground, but it is not practicable on the battle-field." The French have since last year discontinued the use of supports, the battalion having only a firing line followed by the battalion reserve. "The distribution in depth is thus simplified, and equally so the entire fighting mechanism and conduct of the attack." It is foretold that

the formation in two ranks for forward movements under fire will be abandoned, the increased effect of fire having "pressed back the drill formations year by year from one position to another in favor of really practicable fighting formations." With regard to the frontal advance of infantry to close distances, it is held to be impossible without making free use of the rifle: "In spite of all theory, the infantry of the attack will be frequently forced to a serious fire action, even at medium ranges, and the tactical procedure must be adapted to this requirement."—*Army and Navy Gazette.*

CAVALRY TACTICS.

The year 1895 has put an end to the great conflict of opinions that has arisen regarding the principles that should regulate cavalry drill. A new regulation was published in September for the German cavalry, which set at rest many of the points that had been lately under discussion. Foot drill is relegated to its earlier position as serving chiefly as an aid to disciplining the troops. The general principles of mounted training are extended in their application and simplified, so that the position of the squadron within the regiment does not change so frequently as formerly. A large number of formations that could be dispensed with in the drill of the regiment have been done away with.

The principle that only those formations have a claim to be preserved that are capable of employment before the enemy has been followed. The regulations, though on the whole materially shortened, have received a comparatively extensive addition in the shape of a new chapter on the cavalry fight, thus satisfying a wish long expressed by many. This chapter is deserving of credit for having placed great tasks before the cavalry, for indicating clearly and concisely how the end is to be attained and for demanding throughout energetic action.

It covers the ground of its operations before and after the great collision of the armies; but also deals with its participation in the battle itself. In this it is now officially given an honorable rôle, and a decisive coöperation is anticipated from the masses formed of combined divisions operating under a united leading.—*Von Löbell's Annual Reports.—Journal R. U. S. I.*

CAVALRY IN THE NEXT WAR.

One of the most important features of the next war will be the employment of large masses of cavalry in advance of the hostile armies. For the purposes of entering the enemy's country and hindering his plans of mobilization and concentration, screening the advance of friendly forces, and obtaining information as to the movements and purposes of the enemy, independent cavalry divisions have been organized in all modern armies.

It is indeed true that the employment of cavalry upon the service of exploration is no new thing, for Napoleon's cavalry operations are among the most famous of his military exploits; but during the long peace that followed his wars the training of that arm was neglected, and its great services forgotten. It, therefore, happened that in the war of 1866 no proper system of reconnoissance was carried out, and on the very eve of the battle of Königgrätz, when the outposts of the opposing armies were less than

five miles distant from one another, neither suspected the near and concentrated presence of the other.

Although in the war of 1870 the German cavalry played an important part, its use in advance of the army was the outcome of experience gained in the earlier part of the campaign, especially after the battle of Woerth, when the failure of the cavalry to act with boldness allowed the French army to reach the Vosges passes without being pursued. From this time forward the German cavalry was employed in large bodies in advance of the army corps, but the service was without organization and method, and the success which attended it was to a great extent due to the utter failure of the French to checkmate the enemy.

These lessons have not been lost, and it is now clearly recognized that the use of cavalry in advance of armies is of the greatest importance. By its greater mobility it can enter the enemy's country within a few hours of the declaration of war, and before the concentration of other troops can be carried out. Its first duty will be to hamper the mobilization of the hostile forces, and for this purpose it may be here remarked that Russia keeps 30,000 horsemen constantly on the frontier of Poland. Its next great object will be to find the enemy's camps and marching columns, and constantly keep the Commander-in-chief informed of his whereabouts and movements; for, as Frederick the Great says, if one could be always acquainted with the enemy's designs beforehand, one could always beat him, even with an inferior force.

The employment of horse artillery batteries with independent cavalry divisions is important, and in some operations the assistance of guns would be absolutely necessary, as, for instance, when detachments of the enemy occupy a farm or defile. In such a case a small body might delay the advance of cavalry for a considerable period, whereas a few shells would be sufficient to drive it from its stronghold. On the line of march also columns of the enemy would be obliged to halt and deploy under fire of a few guns, and artillery can delay the advance of troops over ground upon which cavalry could not be deployed.

As in the next campaign similar masses of cavalry will be advanced by both sides, and pushed boldly forward with the same object in view, cavalry engagements on a large scale may be expected before the hostile armies can arrive upon the scene of action. Upon the issue of the struggle between these bodies of horsemen much will depend, for the side that prevails will be able to gather information respecting the enemy, hamper his movements, and cover the advance of the army in rear. That one side will obtain so decisive a superiority is, however, doubtful, for where large masses are engaged on a wide front defeat at one point may be counterbalanced by victory at another, and in any case it is certain that even the victorious side would advance under difficult conditions.

When the hostile armies have closed in, and the advanced cavalry clears away from between them, its task will not then be at an end; for whether advancing to meet an enemy making an offensive movement, reconnoitring a force in camp, hanging on a column on the line of march, or pursuing a retreating army, its work will be constant while the campaign lasts.—*The Pall Mall Gazette.*

LAST YEAR'S PRACTICE AT OKEHAMPTON.

In an issue of the *Proceedings* of the Royal Artillery Institution, recently published, there appears a report of a lecture given by Captain J. Headlam, R.A., on Okehampton experiences last year.

In regard to the main features of last year's practice, Captain Headam briefly sums them up as follows:—A decided advance towards service conditions; a rigid adherence to regulation methods; a considerably increased use of surprise and moving targets. Captain Headlam then observes:—For some years past we have had tactical schemes, but batteries have known the targets they would have to fire at, and the time or the rounds to fire at each, and have arranged accordingly. That is scarcely service conditions. This year for all service practice a "general idea" was issued the night before giving such information as might fairly be forthcoming on service, but no more. Arrived at the rendezvous, commanding officers received orders, as no doubt would happen on service, as to what they had to do; the method of doing it being left entirely to themselves. A battery opening fire did not know whether that fire was to be continued for fifty rounds, or whether a change of target or position would not occur before even ranging was completed. Criticism was directed not only to the way in which the fire of the battery or brigade division was administered, but also as to whether the commanding officer handled his force in accordance with the tactical conditions. In fact, as far as possible, the training was directed to "employment and conduct of artillery in the field" as well as to "gunnery."

A strict adherence to regulations is of more importance than it is sometimes considered. There may be, for instance, better ways of ranging a battery than that which is in our drill-book, though it must be remembered that the drill-book is the result of the collective experience of many years. If there were no such thing as casualties there would be, comparatively speaking, little harm in each commander elaborating a system for himself. But, unfortunately, we are all mortal. What could be more disastrous on service than the sudden accession to command of a major with a "system" totally different from that in which the battery had been drilled? For service purposes I think it is impossible to exaggerate the importance of a rigid adherence to the drill-book, and I am rejoiced to find that I can quote no less an authority than our own new Commander-in-chief in support of these views. Writing recently on this very subject he said: "The regulations in this matter cannot be too rigidly adhered to."

The question of targets is one that so vitally affects the practice as a training for service, and the progress made in this respect has been so decided, that I shall devote some time to their consideration. Taking first the surprise targets, the improvement this year is in the greater number used, and in the greater variety in their positions. It is hardly necessary to point out that a surprise target, the position of which is known, loses a great part, though not all, of its value. I hope by next year there will be many more splinter-proofs, so that the number of surprise targets may be very greatly increased. The excellent practice they give in changes of target is universally acknowledged. Used (as I think General Tyler first used

them) to represent a sudden attack on a battery on the move, their value can scarcely be over-estimated. The excitement and confusion that frequently occurred showed plainly the necessity of training for such emergencies. Adverse criticism from outside, though not pleasant, is sometimes wholesome, and I will therefore read what one of the senior officers who were present says of the effect of such a target: "The sudden appearance of infantry demoralizes artillery!"

The moving targets were the new tramway target on No. 3 range, an infantry target on No. 2 range, and a cavalry target on No. 1. The greater number available allowed of their being in all cases part of the tactical scheme. There was no special day devoted to "the moving target"—in fact, I think one formed part of each day's service practice. I will say something of each in the order in which I have just mentioned them.

The tramway is half a mile long, on the switchback principle, and is most ingeniously designed so that the targets should move at walk, trot, or gallop, as desired. Unfortunately, with a wind against it (as was almost invariably the case this year), the gradient is not steep enough, and so we could only manage to get the complete run by substituting small flags for the figure targets and by sending them at full speed. We had hoped to have five full-sized cavalry figures on each truck, sixty in all; as it was, a few flags rushing diagonally across the front at twenty miles an hour was scarcely a fair target. I trust this will be put right before next season, for it is of the utmost importance that batteries should know, what they cannot know now, how to deal with cavalry moving at a trot or canter at ranges between, say, 1200 and 2000 yards.

The other moving targets were all on the principle brought in by General Richardson—five cavalry or seven infantry figures on a barrel. The infantry targets were moved two abreast, a great improvement over a single one. Another novelty in their arrangement was that surprise targets were placed in line with them on to which fire was first turned. After a few minutes the moving portion of the line advanced, and the sections represented by surprise targets were turned off; the idea being to represent a line of infantry doing what infantry officers say they would always do—move as soon as our fire became effective.

As regards the system of firing against these targets, there has been a feeling for some time that the service system was not perfect, and last year this feeling found expression in the reports of the commandants both at Okehampton and Glenbeigh. It was suggested that ordinary fire with some slight modifications might be made available against an advancing or retiring target; so doing away with the special "ranging section" system, and having but one for all occasions. The idea was immediately taken up, and 300 rounds were specially allowed for the purpose of experiment at Shoeburyness, where far greater facilities exist for working moving targets than anywhere else. As this is a matter of such great interest, I will briefly describe how the experiment was carried out.

Two batteries were formed out of the officers and non-commissioned officers of the long course, and trained, one to the service system and one to that proposed. The two batteries then shot against each other, all arrange-

ments for targets, ranges, etc., being made independently of the battery commanders, who were kept in complete ignorance. The two systems were tried alternately on identical targets. The targets were large and the advances long—as much as 1000 yards—and covered all ranges between 2500 and 700 yards. The pace was varied and halts were made (as, no doubt, would occur on service) at uncertain intervals, without any warning being given. Before the practice there was, I think, a very strong leaning to the new system, but when it was over the opinion was unanimous that the service system was the best. It was far easier to work, more rounds were fired, and they were more effective; its advantages being especially apparent when the advance of the target was irregular.

There are no doubt some defects in the service system; the orders, for instance, are absurdly long and complicated, and it is not well described in field artillery drill; but both these will be remedied this winter, and I feel sure that if battery commanders will drill at it, they will find that it is not difficult to work, and that it is very effective. Of course, where the difficulty comes in at practice camps is that there has usually been a ridiculous little target with a very short run; in consequence of the small size of the target the unreal factor of accuracy of direction came in; the laying was slow and ranging rounds unobserved. The short run was in consequence over before any effect was produced, and everybody went away disgusted with the system.

Having given you adverse criticism of infantry officers on our behavior with surprise targets, let me quote what one of them says about the moving target: "The chief point was the wonderfully accurate practice made by the guns on a moving infantry target; so good was it, and so systematic in the way of working that it gave one pause as to the feasibility of a frontal attack of infantry on guns at all." With an increase in this nature of practice, the results next year should be better still.

The improvements in the arrangement of the cavalry target were that it was quite invisible from the battery until it started, and the pace was much quicker than in previous years. It was certainly, I think, as quick as cavalry would move on service, though not possibly equal to that of a certain distinguished regiment of light cavalry, one of whose officers attended some artillery practice this year, and wrote in his report: "The time taken by cavalry advancing over 1000 yards up to the guns would be under one minute." That is at a rate of over thirty-four miles an hour; or to put it another way, just three or four seconds quicker per mile than the best "Derby" record.

Before leaving the subject of moving targets, I wish to draw attention as strongly as I can to the fact that in order to make this practice really valuable, the targets should not be only on one or two well-known runs where they are expected, but that batteries at service practice should never know when they will be turned on to a moving target, or when the target they are firing at will begin to move; and also to the fact that to give valuable practice these targets must have a broad front. We should not on service waste the fire of a battery on half a dozen men, whether infantry or cavalry; and it is not sound to say that practice at a small target is good

training for shooting at a large one. It is not; for it teaches wrong lessons. Accurate direction is almost forced upon the layers; the fire is in consequence slow, and all ranks feel want of confidence in their power to efficiently resist such an attack.

The ground at Okehampton allows of a far greater development in these directions next year, if only the targets and the stores for working them are allowed. The targets themselves are excellent; all we want is more of them.—*United Service Gazette.*

INFANTRY ATTACK.

A correspondent in *The Army and Navy Gazette* recently expressed a desire that some military writers instead of inventing new methods of attack would confine themselves to discussing the subject in conformity with the regulations. With your permission I will endeavor to do so from the German point of view of their own system of attack which has been adapted to our army, and until the next great war has thrown more light on the subject we cannot do better than continue to profit by the experience of those who gained their victories under the fire of breech-loaders when opposed to the troops of the greatest military nation that the world has produced. It is universally admitted that there ought to be no "standard form of attack," which means that rules cannot be laid down beforehand for all movements in the presence of an enemy. Military exponents agree, however, that a certain rule of frontage must be maintained and that the right direction must be kept, but that the depth of an attacking force depends upon whether the unit of attack is opposite the point which is to be assaulted, or is making a holding attack on some other part of the enemy's position. There are thus two methods of attack, one to be adopted when the attack is going to be pressed home, and the other to make a demonstration or holding attack. Would it not be well if these two methods were to be more clearly defined for the guidance of the whole army, and not left to the conception, or perhaps caprice, of numerous commanding officers who, without any intention of infringing the regulations, formulate systems of attack for their own corps, with the result that, instead of there being no authorized form of attack there are numerous unauthorized forms? When trying to explain the mode of infantry attack, as sanctioned by the "Drill Book," to students of all branches of the service I am constantly told "That is not the way we do it in our regiment." At one time I had quite a collection of little books setting forth various systems of attack formation for different corps—line, militia, and volunteers. There must be some reason for so many systems, and it probably lies in the fact that our troops are not welded together in divisions and army corps as they are on the Continent, where, although there may be no authorized form of attack, there is the will of the army corps commander, who has always the same units under him, and whose divisional commanders, and through them their subordinates, become disciples of the same school; with the result that all the units comprising an army corps have the same method instilled into them, and improved upon and perfected under the same masters.

In the attack by infantry the main principles to be observed are: (1) To

reach a place from whence the fire of the defenders can be subdued before the assault is delivered; (2) all movements must conform to the main idea and converge to the decisive point without allowing units to overlap each other; (3) troops in rear of the fighting line must conform to its movements and be kept well in hand. Whilst the artillery of the attack is engaged in attaining a superiority over that of the defense, the infantry divisions are moved into their positions preparatory to the advance to the attack. Here it is that the divisional commanders, after telling off their reserves, explain their instructions and how they propose to carry them out to their brigadiers, allotting to each his task in the coming fight and also the extent of front he is to operate on. The brigade commanders then explain the orders they have received to the officers commanding battalions, and assign to each battalion its task and the front to be occupied by those that are detailed to the first line. The rest is left in the hands of the battalion commanders, who on coming in sight of the enemy in position place as many companies in the first line as they think desirable; these companies then push forward a "firing line" composed of one or two sections furnished from each company, as many as the captains think necessary to cover their allotted fronts. The extended firing line then lies down, while the artillery continues to engage that of the enemy. When the order to advance is given the attack is pushed forward rapidly. For purposes of description the attack is divided into three phases: (1) The preliminary formation out of range of the enemy's artillery (distance chiefly regulated by the formation of the ground); (2) the first halt at 800 yards (approximately) from the position; (3) the final halt at from 150 to 200 yards from the point of attack, just before the assault. The first extensions should be made by as few sections as possible, the remaining sections being kept in close order under control of the captains until they are sent forward into the firing line by their orders. The second and third lines, or only the second line (depending on the ground and upon whether the unit of attack is intended to assault or only to hold the enemy), follow the first line in shallow columns, or in line within supporting distance. The actual distance between the lines is left to the discretion of the commanders, who will be guided by the necessity for supporting the first line, and the formation of the ground. At about 800 yards from the position, wherever the best cover offers, as many rifles as can be used are pushed forward by sections into the firing line.

A brisk fire is now opened supported by the artillery, which may be advanced as close as the ground admits of; the object of this fire is rather to disconcert the defenders and cause them to fire wildly than to inflict serious loss. The distraction thus caused enables the second and third lines to approach nearer to the first. The advance from the 800 yards position is made by each section or larger unit seizing favorable opportunities to move steadily forward in quick time to the next available cover. This system of gradual and steady advance goes on until the firing line arrives within 200 yards of the enemy. Meanwhile the second line conforms to the movements of the firing line, and is extended, and if necessary portions of it are absorbed into the firing line, and the third line is gradually brought nearer. At about 150 to 200 yards from the position the assaulting

line is again formed, this time with as many rifles as can possibly be made effective in action, and magazine fire is opened and after some minutes followed by the assault. The second line joins in the assault, and the third line is handled according to the requirements of the moment and the opportunities offered by the ground, or the necessity for warding off a counter attack, but should be kept in reserve as long as possible.

When the advance is ordered, the commanders in the first line must be left to themselves and not interfered with, unless they are evidently advancing in a wrong direction; they are held responsible for leading their units to the assault in the most advantageous manner, and this is best done by advancing steadily and rapidly from cover to cover. Here it is where method and a generally adopted system is required most. Commanders of companies must work together and give each other time to get their men into the general alignment after passing obstacles. It is most essential to success that this coöperation should exist between all the different units composing the first line. All extended bodies should close up when not exposed to fire and extend again before they come under fire. If a rush is made it should be a preconcerted general forward movement to some cover ahead. Regular alternate rushes are not possible under a hot fire. When infantry is once launched in attack all initiative comes from the front, not from the rear, but a position should not be assaulted, *i.e.*, actually stormed, until the enemy's fire has been subdued.

It is doubtful whether a commander in rear of the fighting line, after it gets within 700 yards of the position, can send orders to it except through the medium of reinforcements. The front of attacks vary with the object, the ground, and the necessity for providing reinforcements, but as a rule should not exceed that which the troops of the first line when fully absorbed into the "firing line" would occupy if in line, with intervals between the sections. The reason for this maximum frontage is that it admits of the utmost development of fire without merging into a line of skirmishers. —H. R. GALL, Captain, *Army and Navy Gazette.*

THE LEE-METFORD BULLET.

The new Lee-Metford bullet invented by the Indian Ordnance Department will, states the *Pioneer*, be subjected to the severest tests as regards ranging powers, while it is intended also to give such sportsmen as may desire to receive them packets of ammunition to be used in shooting deer and larger game. The experiments on carcasses of bullocks at various ranges have been most satisfactory, as the bullet "sets-up" and makes a severe wound, even when big bones are not struck. One has to calculate its effects upon the human frame and upon horses, as in action live infantry and cavalry will have to be stopped. We know already that the sporting .303 bullet as now prepared by gunmakers is most effective even against the biggest game, but this form of pellet cannot be used for military purposes as it is practically an "express," and moreover it will not carry accurately to long ranges. What is needed by our soldiers is a bullet that will stop men at all distances and yet have a long flight without too high a trajectory. This has been secured in the Dum-Dum Factory by the modification of the present cupro-

nickel envelope, which has been given a solid base while at the point the lead is slightly exposed. As mentioned recently, this bullet at 1000 yards range gives an excellent target, a few grains more of cordite being all that is required to make its flight correspond to that of the pellet now in use. There is thus no change of sighting necessary as regards the rifle, and the British soldier can rest satisfied that when he fires at an enemy, whether at close quarters or at long distances, it will be his own fault if he does not put him out of action. Fanatics charging will find that the wounds they receive will be very different from those inflicted at the Malakand, where the lead-pencil bullet in its metal casing bored tiny holes through men and often did little real damage.

Fifty thousand rounds of ammunition of the new pattern, are now being made up for trial at the Musketry Schools and on the long range at Balasore and forty thousand will be kept for experiments at the Meerut Rifle Meeting in December. As sixty or seventy regiments will be represented at that gathering, the results of the shooting will become known all over the Punjab and Bengal commands, and we have not the least doubt that confidence in the Lee-Metford will be thoroughly reëstablished. The new bullet will, of course, have less power of penetration than the old one; it will not pass through trees and brick walls, as from its structure it must "set up"; but, on the other hand, it will "stop" men and horses, and after all, this is the most that can be asked of rifle-fire. It is the province of artillery to search cover with shell-fire and to break down breastworks and walls; infantry have to deal with infantry or with squadrons of cavalry charging against them. We do not yet know what the home authorities have done in this matter of a small-bore bullet with stopping powers. The ten thousand rounds of ammunition which they have sent out are, it appears, merely for short-range firing, the charge of cordite being little more than would be used for revolver cartridges. The bullet is of a different pattern to that in common use, but it has no particular merits from a military point of view. The cartridge has probably been made to meet the difficulty felt in England of getting rifle-ranges where targets can be put up safely at long distances. In India this difficulty does not occur, as there is always ground available near every cantonment.—*United Service Gazette.*

THE RIFLE OF THE FUTURE.

General Wille, a German officer who has made the question of the armament of troops his special study, writes in the German papers on the rifle of the future in these terms:—

"What will the rifle be that will displace the weapons now in use in different countries? The rapidity of shooting is quite sufficient, and it would be dangerous from the point of view of the supply of ammunition to wish it any increased rapidity. Military reformers must look to the automatic rifle as the future weapon, because it averts all mechanical operation in loading, permits the soldier to concentrate the whole of his attention on the object and to take calm aim, suppresses the recoil, and renders misfires impossible. Up to the present automatic rifles are of four distinct systems—first, the barrel slipping backwards; second, the fixed barrel; third,

the fixed barrel with a parallel tube; and fourth, the barrel moving forwards. The most remarkable types are the Maxim, the Mannlicher, and the Cei, the last of which has just been tested in Italy with good results. In these weapons the force of recoil is employed for charging and closing the breech, so that the firer has only to let off the shot in order to again load the weapon, so that the number of shots discharged without an effort is precisely the same as the total contents of the magazine. The mechanism of the automatic rifle is simplicity itself, and the only part of it that shows any strain is the springs. From recent experiments in in Austria these were in some cases worn out after 10,000 discharges, but in others they were still good after as many as 40,000."

A NOVEL MILITARY COMPETITION.

With the object of promoting celerity and precision of movement in rapidly crossing rough country beset with various obstacles such as would be likely to be met with on enclosed ground, General the Duke of Connaught commanding the Aldershot District, caused a competition to be organized for regimental teams under his command, for a handsome shield presented by himself. This competition took place on the 21st inst. over a new obstacle course about a mile in length, and the following 15 teams, who had for some time been practising, entered:—2d Bedford, 1st Royal Scots Fusiliers, 2d East Lancashire, 1st Manchester, 2d Rifle Brigade, 2d Leicester, 1st Border, 4th King's Royal Rifle Corps, 1st Argyll and Southerland Highlanders, 4th Rifle Brigade, 2d Royal West Surrey, 2d Norfolk, 2d South Wales Borderers, 1st Seaforth Highlanders, and 1st Royal Scots. The obstacles were made sufficiently wide to allow of 24 men abreast simultaneously vaulting or jumping them. Each battalion team consisted of two officers, eight sergeants (two to each section), and four sections each of 24 rank and file, making a total of 106. The troops were dressed in drill order and carried their rifles at the trail. Officers wore their swords, but were permitted to take any position they pleased with relation to their teams provided they kept within the course and took all the obstacles. Col. G. M. Fox, Inspector of Army Gymnasia, acted as starter. The teams paraded in heavy rain on the Army Athletic Ground, but the first obstacle, which consisted of balancing beams, was rendered so slippery by the wet that it was deemed advisable to strike it off the programme. The other obstacles, however, which consisted of vaulting, rails, ditches, and a fortified hill, were successfully surmounted. The winning team proved to be that of the 4th King's Royal Rifle Corps, who completed the course in 8 min. 12 sec. and gained 147½ points. The 2d Rifle Brigade were second with 111 points, their time being 9 min. 32 sec.; and the 4th Rifle Brigade third, with 107 points, and time 8 min. 42 secs. Teams occupying more than ten minutes were not placed. The prizes were presented by the Duke from the summit of the fort on Smallshot Hill, the teams being drawn up on the slope. His Royal Highness, having presented the prizes, addressed the troops as follows:—"I want to say that I think we have had a very excellent performance and a thorough soldiers' performance. It has been difficult work, and the weather has added much to the difficulty by making the ground so slip-

pery. I am highly pleased at the success of the competition, in which everybody seems to have taken immense interest. I not only congratulate the winners, but those who have not won; for all have done so well that I do not wish those who are not successful to be discouraged, but to take heart and try and win another year. In this competition everybody has striven to do his best, and I desire to tell the officers and non-commissioned officers who have taken such trouble in training their teams how much I appreciate the good work they have done." Ringing cheers were then given for the Duke of Connaught and the winning team.

FRAMING OF ORDERS IN THE FIELD.

Seldom has a more comprehensive or a more instructive lecture been delivered at the Royal United Service Institution than that by Colonel Henderson, of the Staff College, on "The Framing of Orders in the Field." The lecture is now published in the *Journal*, and is therefore within the reach of all officers. The importance of the subject and the enormous interests involved should secure a large circle of readers, for there is no officer, whether senior or junior, to whom it is not of the utmost moment that he should both receive and give distinct, concise, and clearly intelligible orders. This can only be done by practice. Not only must there be a clear-headed comprehension of the situation and of the particular object to which the order refers, but it must be expressed in concise and unmistakable language. There must, at the same time, be nothing omitted and nothing superfluous in the substance of the order. It is evident that the best means of attaining the desired proficiency is to practice the writing of orders. As the lecturer remarks, "written orders can be more readily criticised than verbal ones, mistakes are more patent, excuse is impossible, and the order, improved by the instructor, remains a guide for future use." This illustrates the truth uttered by Bacon when he said that "reading made a full man, conference a ready man, and writing an exact man"; and if we substitute for "conference" experience in the field this famous saying applies as much to a soldier as to a scholar. Colonel Henderson supplies numerous examples of the loss and disaster which have in modern as well as in more ancient times been caused by orders that were not exact. He also gives instances of orders which were inadequate and of others which erred by excess. At this very moment we hear complaints from at least one army that the initiative is being destroyed in the subordinate leaders by persistent attempts in general orders to provide for every possible situation. Here again the value is indisputable of practicing, as an exercise, the framing of written orders, in which the golden mean is maintained by including all that should emanate from a commander and nothing that should be left to his officers. "The great difficulty," says Colonel Henderson, "which confronts officers in our service is the lack of theoretical instruction and of good models. The question really resolves itself into this: How are officers who intend to attain such skill in framing orders as to be able to instruct others, to instruct themselves?" The answer given to this question is virtually as follows: Although there are at our disposal the records of the campaigns of Wellington and other British generals in all

parts of the world, in which ample materials might be found for the instruction of British officers, yet we must once more have recourse to Germany. In the latter country the framing of orders has been reduced to a science, while here it is but in its infancy. In Germany there are instructional works dealing with the subject in all its branches, but here we have no native handbook whatever; and until Colonel Henderson or some other expert furnishes us with such a book, students cannot do better than master the contents of the lecture before us. The orders applicable to a European country, of which good maps are in the hands of officers, must manifestly differ from those issued in the savage or half-civilized countries where British troops are so much engaged. In no army in the world is an all-round training so necessary for an officer as in our own, and we cannot help thinking that it is to their own comrades and instructors that British officers should look for the compilation of a book to guide them on this subject. It is gratifying to note that "the examinations for promotion are to-day chiefly concerned with orders, and in my humble opinion this is a long and most practical step forward. It would seem, however, that preparation for such examinations and instruction in the art of framing orders cannot begin too soon. Simple orders might well be made a feature of all military examinations. From the moment a boy joins as a cadet he should be taught to apply the principles of tactics by presenting his ideas in the shape of orders, and a movement in this direction has already, I believe, been made at the Royal Military College." An appendix to the lecture contains "Skeleton Orders for a Field Force of all Arms," also "Rules on Framing Orders in the Field." There are twenty-four of the latter. They are eminently practical, and we are persuaded that juniors could not employ their time better than by committing them to memory. Colonel Henderson deserves our best thanks for bringing this important matter so prominently before the service.

RULES ON FRAMING ORDERS IN THE FIELD.

1. Heading should invariably contain number, place, date, hour.

2. If in a town or village, it is not sufficient to head orders "Headquarters"; the name or locality of the building should be given.

3. The language should be simple and the sentences short.

4. The handwriting should be legible.

5. The paragraphs should be numbered.

6. The paragraphs should be in logical sequence, so that the orders can be read through without interruption or harking back.

7. Everything the recipient ought to know, in order to enable him to act intelligently in accordance with the spirit of the orders, should be included.

8. In all cases where exact knowledge of the enemy's strength or dispositions is at hand, the source of such information as is published should be invariably given. It is well, moreover, in publishing the enemy's dispositions, to say at what hour he was at such or such a place; for instance:

"According to the reports of the inhabitants, at least 10,000 men of all arms arrived at A this morning, April 10th, and were in occupation of that village at 3.30 this afternoon."

9. All names and places should be printed in block capitals.

10. If there are two places of the same name, care should be taken to distinguish which is alluded to. It will be found that there are often farms, woods, cross-roads, of the same name in the same district.

11. If cross-roads are mentioned, their exact position should be carefully described.

12. The map used should be mentioned.

13. Great care should be employed in using such terms as "right," "left," "before," "behind," "front," "rear," "on this side of," "on that side of."

14. Suppositions and probabilities, as well as instructions to meet possible contingencies, are generally bad.

15. "An order should contain nothing which the subordinate commanders, who have to execute it, can arrange for themselves."—Von Moltke.

16. "No order should be issued for anything that would be done by the troops without special orders. If the troops are accustomed to have every detail of their normal duty pointed out in orders, they will get into the habit of doing nothing when orders are not forthcoming."—Von der Goltz.

17. "The superior officer should never prescribe to his subordinate at a distance what the latter is better able to decide from being on the spot."—Von der Goltz.

18. "The expression 'will await further orders' should be most sparingly used. Such a measure paralyzes the subordinate leaders."—Von Moltke.

19. In an order of march it should always be stated that the head of the column will move off from or pass a prescribed point at a certain time. So as not to block lateral communications, the head of the column should always form up in rear of cross-roads, or the tail in front of them.

20. Detachments, including advanced, rear, and flank guards, as well as turning columns, should have a C. O. detailed by name in orders. This facilitates the delivery of messages and reports.

21. If there is in an order a single word, the omission of which would make no difference to the meaning, the order is too long.

22. All orders sent by telegram should be carefully numbered.

23. An officer after writing the order should test its clearness by reading it over, and putting himself in the place of the officer who is to execute it.

24. It is a great safeguard if, before issue, the order is read over and checked by an officer other than the writer.

THE AUTUMN MANŒUVRES.

Continuous downpours of rain sadly interfered with the comfort of the troops engaged in the French grand manœuvres and led to some changes in the programme. The main lines, however, were adhered to, and the troops by all accounts showed the best spirits and most soldierlike qualities under depressing circumstances. Colonel F. Robert, who has been reporting upon the manœuvres for the *France Militaire*, grew enthusiastic concerning the discipline and endurance displayed by officers and men. Thus, on the fourth day, when the 17th Corps defended Mons against a powerful attack directed against the place by the 12th Corps, the men on

one side and the other were aroused at midnight and two A. M., after having undergone much fatigue on the previous day, then set out upon marches of more than twenty kilometres, of which more than half was through heavy land. Then came six hours of fighting, and at the close the men, though fatigued, were in excellent spirits and in a state of perfect discipline. They had shown, says Colonel Robert, that they were ready for any employment and in a state to bear any fatigue. He speaks of the tactical progress shown by the different arms, their cohesion and suppleness, and the admirable manner in which they worked together. He adds in regard to the fine marching qualities of the men that, on September 12, almost all the regiments of the 17th Corps, leaving their quarters at midnight, marched forty kilometres, of which ten or twelve were over fields, and did not reach their camp until four or five o'clock in the afternoon. The positions chosen by the artillery, he says, were always good, and its operations in support of the infantry admirable. He was particularly struck with the fine manner in which the cavalry of the 17th Corps enveloped the right wing of the retreating 12th Corps. On the other hand, the divisional cavalry did not render all the services expected of it. It was too much broken up, the men did not care properly for their horses, the heads of the columns were weak, and the commissariat arrangements were defective.

The *Avenir Militaire* is not less warm in its praise for the fine qualities displayed by the men, but considers the positions in which they were placed somewhat *bizarre*. The discipline was perfect, but there was want of intelligence on the part of those who wound up the clock daily. Into the details of the operations it is, however, unnecessary to enter. Thinking men were in fear, we read, of a collision between General Caillot, directing the manœuvres, and General de St. Mars, commanding the 12th Corps. The air was so charged with electricity, says our contemporary, that a discharge might have occurred more dangerous than the thunders of the mimic battle of Sonneville. However, all unpleasantness was averted, and the manœuvres came to a conclusion with an impressive review, at which President Faure was present. Colonel Robert was particularly pleased that during the first part of the manœuvres, without knowing the tactical dispositions of the generals, he was able upon the field, by watching the movements of the troops, to divine the orders given, the object pursued, and the tactical methods employed. A system is good, he says, if, when applied by different men, it leads to the adoption of like dispositions and of identical means. By a singular coincidence, General de St. Mars, of the 12th Corps, who with General Fabre has been maintained on the active list, and all the generals employed with the 17th Corps will attain the limit of age for retirement almost at once. Two generals, however, says Colonel Robert, who have given proof of their ability during the manœuvres, by reason of their service, their knowledge, their energy, and their brilliant record, are especially indicated as preëminently fitted for the command of corps. These are Generals Guioth and Sesmaisons.

The Austrian manœuvres near Csakatornya terminated on Tuesday. The manœuvres lasted three days, during which 70,000 men were engaged. The manœuvres are said to have been chiefly remarkable for the brilliant

tactical ability shown by General Reinlaender, commanding the 3d Gratz Army Corps. The fight on Monday was decided after an hour's engagement, which ended in the capture of the entire 42d Honved Infantry Division. In the next day's battle General Reinlaender suddenly surrounded Borsetzky's 36th Division, including an entire army corps and a convoy of wagons at the base in Csakatornya, causing such confusion that the emperor at once ordered the signal to be sounded for firing to cease. The weather has been wet and the roads almost knee-deep in mud, yet there have been but few cases of sickness in camp. The powers of endurance displayed by the Croats, Bosnians, and the Hungarian Honveds have been really marvellous.

A lamentable event is reported to have occurred towards dusk on Monday evening. A mounted patrol of the 5th Gratz Dragoons, belonging to the 3d Army Corps, while out reconnoitring, suddenly came into contact with an advance post of the 96th Croatian Infantry, guarding the left flank of the 13th Army Corps close to the village of Maskovec. The outpost party delivered a sharp fire, and one of the infantrymen loaded his rifle with ball cartridge—whether through inadvertence or malice is not yet known. One bullet hit a dragoon, fracturing his spine and killing him on the spot. Passing through his body it broke the foreleg of another dragoon's horse, which had to be shot immediately. All the men composing the outpost party were at once put under arrest.

According to all accounts, not only did the *bicyclette pliante* of Captain Gérard answer all expectations at the French cyclist manœuvres, but the tactical opportunities it opened were pronounced to be very considerable. A writer in the *Figaro*, with the pseudonym of "Marcellus," goes too far when he declares that cyclists need take no account of kilometres, but he gives an excellent illustration of the use to which they were put. Two parties, each consisting of an officer and four cyclist infantrymen, left the outposts of the 4th Division in front of Etréaupont at one o'clock on the morning of September 15, and parting company, gave Saint Quentin a wide berth on either hand. There was continuous driving rain, but the cyclists proceeded, and after a journey of from sixty to seventy kilometres (thirty-seven to forty-three miles) from the starting point, were able to witness the whole of the enemy's division march by from their post some little distance from the Ham road. At midday they conveyed intelligence of this movement to their headquarters, and at five o'clock in the afternoon reported the bivouac chosen by the enemy. With this intelligence General Sonnois was able to execute the delicate operation of turning on his left flank and crossing the Oise, while the general in command of the enemy, imperfectly informed, took up an unfavorable position for the next day's battle.

From these experiences "Marcellus" proceeds to discuss the organization and equipment of cyclists. He wisely says that a company must be the largest unit, since a battalion of cyclists would be unwieldy and very difficult to command. His company, however, would consist of not less than 200 men in order that its fire might be effective, but he strongly insists that cyclists should avoid infantry, and attack only cavalry, artillery, and convoys by surprise. He thus gives them a prominent fighting rôle. The

uniform he prefers is similar to that of the French Alpine troops, but with a shoe specially adapted for cycling, and for weapon he would give the men a carbine with short bayonet. His proposal is that a company shall be attached to each of the independent cavalry divisions and to each army corps, involving the creation of twenty-seven companies in all. The 6000 machines required would cost £72,000. Captain Gérard has given over to the State all rights in his invention, and thus the cost of each machine does not exceed £12.

It is always interesting to gather the several opinions of French and German officers upon the armies of their respective rivals. A very temperate and reasonable article upon the German manœuvres appears in the *France Militaire*. Our contemporary does not think that the operations disclosed much that was new, but it gives credit in several directions. The many cavalry charges are referred to without comment, but the writer remarks that both the infantry and artillery showed much greater ability in taking advantage of the irregularities of the ground than in previous years. Attention is drawn to the fact that in the beginning of actions there was a marked tendency to mass the artillery, and to concentrate its fire upon particular points, whence the conclusion is reached that French ideas are finding an echo beyond the frontier. The telegraph sections were employed, we are told, in order to discover if the pioneers were fully capable of rendering the important services necessary for the telegraph department. The experience would seem to have been unsatisfactory, for it has since been determined to create an independent telegraph corps, with all the elements necessary for its work in the field. The balloon section was represented, and *meldereiter*, or orderlies, and cyclists were employed, these last only for carrying dispatches. Our contemporary marked no change in tactical methods. The purpose, as in previous years, was to hold the enemy in check on his front, to attempt to crush him by a powerful artillery fire, then to endeavor to envelop his flanks, and, at the proper moment, to advance to the attack with the whole line.—*Army and Navy Gazette.*

FRENCH GENERAL OFFICERS.

According to the *Militär-Wochenblatt*, of the 108 generals of division now serving in the French army two came from the former General Staff Corps, fifty-two from the infantry, twenty-two from the cavalry, twenty-one from the artillery, and eleven from the engineers. Of the 214 brigadiers 101 are from the infantry, forty-seven from the cavalry, forty from the artillery, twenty from the engineers, and six from the gendarmerie.

NOTES ON THE GERMAN SIEGE ARTILLERY.

I saw the men drilling at 15-cm.* guns and howitzers at the Fortress of Ehrenbreitstein. The directions were somewhat similar to ours, and each gunner was required to repeat the instructions of the under officer after each stage of the drill.

The men were fine sturdy fellows, averaging 5 ft. 6 in. in height. The ascent to the drill grounds is very steep, and sentries confront one at every

* 9-cm. = 3.5 in.; 12-cm. = 4.7 in.; 13-cm. = 5.1 in.; 15-cm. = 5.9 in.; 21-cm. = 8.2 in.

turn. One parade ground is apparently for infantry drills, and the other for artillery exercises. Round the sides of the square constituting the latter are numerous drill sheds, on the outer sides of which are targets painted to represent German soldiers. On the land side of this spacious parade ground, at the top of the fortress, are extensive intrenchments, in which were mounted eight 15-cm. guns on overbank carriages, and six heavy 13-cm. pieces on the ordinary garrison standing carriages.

These guns were grouped in couples in the same emplacement, and on the flank of each group was built into the parapet a "crow's nest" for the "observer."

When not in use these guns were covered with a wooden cradle, over which was thrown a tarpaulin.

In the square were parked sixteen 15-cm. howitzers with limbers fitted for pole draught.

A battalion of foot artillery consists of four companies, with a regimental staff of one lieut.-colonel, one adjutant, three other junior officers and some staff artificers attached.

On mobilization a battalion forms in addition one park company, which takes ten days to mobilize and is practically of the same strength as an ordinary company. This latter on a peace footing is of the following strength: 1 captain, 3 lieutenants or 2d lieutenants, 1 sergeant-major, 1 vice ditto, 1 ensign, 4 sergeants, 4 sergeant-artificers, 11 under officers, 10 bombardiers, 13 acting-bombardiers, 2 buglers, and 70 gunners—total 119 all ranks, normal footing. On mobilization the number of gunners is increased to 160.

All the battalions told off to the land forts would work, when required on active service, the siege parks and heavy artillery accompanying the force engaged in active operations, whilst it is understood that their place on the forts would be taken by Landwehr battalions.

The siege parks, of which there are three or four sections, each in peace divided amongst the twelve principal fortresses, and including an "Abtheilung" of four park ammunition columns to each section, include the following pieces of ordnance:

24 heavy 12-cm. guns,
12 short 15-cm. guns,
6 belted 15-cm. guns,
6 21-cm. rifled mortars (howitzers),
6 15-cm. " " "
6 9-cm. " " "

Total 60 pieces.

For each of these is supplied the following ammunition:

Rounds.
1000 common shell for each of heavy 12-cm. or 15-cm. belted guns.
200 shrapnel " " " " " "
1000 common shell for each short 15-cm. gun.
100 shrapnel " " " "
1000 double shell for each 15-cm. and 21-cm. mortar.

100 common shell for each 9-cm. mortar.

50 chilled shot for armor-piercing are also supplied for each 15-cm. belted gun.

In addition to the above and also divided amongst the fortresses are the following:

(1.) Two reserve siege parks of the same composition as the preceding, but formed in part of the guns detailed as armament of the fortress with no ammunition columns.

(2.) Two special siege parks, which would march with the field army to bombard barrier forts, or be employed as batteries of position, each park being composed of forty guns and an "Abtheilung" of four park ammunition columns. The ordnance of these parks is made up of twelve heavy 12-cm. guns, twenty short 15-cm. guns, and eight 21-cm. rifled mortars (howitzers), with a supply of 1000 common shell and 200 shrapnel for each gun and 1000 shell for each mortar.

(3.) Three reserve sections each of twenty-four guns, viz., twelve short 21-cm. or t elve heavy 12-cm. bronze guns and twelve heavy 9-cm. bronze guns, with 1000 common and 200 shrapnel shell for the 9 and 12-cm. guns and 1000 common shell for the 21-cm. guns.

To each section of a siege park or special siege parks would be attached a foot-artillery regiment of two battalions (about fifty-six officers and 2200 N.C.O.'s and men), with two mobilized park companies.

A special staff is formed for each park, and it is probable that the inspectors of foot artillery and their staffs would take charge of the siege parks, whilst the staff of the regiment attached would perform the same duties for the special and reserve parks.

The park ammunition columns would each have 1 captain, 1 2d lieutenant, 1 sergt.-major, 2 sergeants, 7 under officers, 8 lance-corporals, 80 train drivers, 1 farrier, 16 riding and 164 draught horses, and 40 four-horsed ammunition wagons.

The German siege guns are all of hard bronze and breech-loading.

The special uses of each of these siege guns is as follows:

9-cm. heavy gun. To fire at personnel, reply to the pieces of the mobile defense, fire on sap heads, and enfilade counter approaches. It may also be used for dismounting guns, destroying sand-bag embrasures, etc., when it is inconvenient to bring heavier guns to bear. At ranges under 800 yards it has given good results against guns behind blinded embrasures. It is also employed to bring shrapnel fire to bear on the enemy's works and to annoy parties repairing damages in the defense works.

12-cm. heavy gun. This gun is used to bring an accurate fire to bear at long ranges. During the first stages of a siege it is used to oppose the enemy's guns by shrapnel fire at long ranges, and, later, at ranges below 1650 yards, to dismount guns and destroy light parapets or walls of ordinary thickness, or for bombardment. It may be substituted for the belted 15 cm. gun if difficulties of transport prevent the latter from being used.

Short 15-cm. gun. Principally used for indirect fire to destroy earth or stone obstacles. It gives good results against detached walls with angles of descent of 24°, and remaining velocity of 1080 f.s. It is used also for

enfilade fire at 2000 yards range and over, and against non-blinded gun emplacements at 1650 to 2200 yards. Up to 1200 yards it is used for dismounting guns, and gives good results with shrapnel against men behind cover, although the angles of descent are great. It is employed also for bombardments, and generally speaking in the first and second artillery positions.

Belted 15-cm. gun. Its principal uses are for breaching at long ranges, dismounting guns up to 1650 yards, bombardment, and shrapnel fire, which latter is very efficacious at long ranges. It fires also armor-piercing projectiles, and is generally used in the first artillery position.

Short 21-cm. gun. This gun is principally used for breaching at short ranges when the 15-cm. projectiles are not sufficiently powerful, *i. e.*, against strong masonry with large angles of descent, and at ranges up to 2300 yards. It is used in the second artillery position.

9-cm. mortar. Used against personnel and matériel at ranges from 500 to 1500 yards. The greatest effect is obtained with powder charges of from $4\frac{1}{2}$ to $5\frac{1}{4}$ oz., with angles of elevation from 15° to 25°, corresponding to ranges of from 660 to 1320 yards. Specially used for enfilade fire, and of greatest effect when the shells are exploded against resisting objects. Principally used in the second artillery position, and in siege batteries where a massed fire can be delivered. Platforms are not necessary, but the carriage must be as nearly horizontal as possible.

15-cm. mortar. This piece is principally employed for long-range high-angle fire up to ranges of 2250. It can search the interior of works at medium and long ranges, fire against blinded guns, destroy platforms and render communications in general impossible. It is principally used in the second artillery position.

21-cm. mortar. Used for destroying casemates, escarps, traverses, ramps, etc., and for general purposes of bombardment. It is principally employed in the first artillery position, and its most effective range is about 2200 yards.

Carriages. The carriages at present in the service for the 9-, 12-, 15-cm. short and belted, and 21-cm. guns are some of wood and some of iron. A certain proportion are fitted with arrangements for overbank fire. The carriages for the 9- and 15-cm. mortars are similar to our mortar carriages, although the pieces themselves are of course B.L. Those for the 21-cm. mortars are of iron, and similar to our 8 in. howitzer carriages.— Major H. C. C. D. SIMPSON, R. A., *Proceedings Royal Artillery Institution.*

Comment and Criticism.

"The Soldier's Boot."

W. Carden Roe, Deputy Surgeon-General (British.—Retired).

OF all the apparel which an infantry soldier wears his boots are by far the most important, for upon ease and comfort of their fit, their pliancy, and their lightness, his efficiency in no small degree depends. On the line of march, in peace or in war, a tight tunic may be unbuttoned, or a heavy and clumsy valise carried by a comrade, but the soldier who tries to march in badly-shaped, tight, and unyielding boots can only escape his ever-increasing torture by taking a seat in the ambulance wagon, and if he is wise he will do so in time, for should he doggedly hobble on to his next camp he will probably have rendered himself inefficient from footsoreness, and is then nothing better than an encumbrance.

If it was possible to have the feet of each soldier modelled and the lasts upon which his boots are made cut in conformity therewith, he need not, as he now does, entertain doubts about his comfort when he puts on a new pair of boots; but as this is not feasible, and as it is impossible to have the ordinary badly-shaped lasts patched, pieced, and altered after the manner invariably adopted by our private bootmakers, it is essential that the last upon which our soldiers' boots are made should bear some resemblance to the human foot. The ordinary last does not make provision for the comparatively large size of the great toe, especially over the joint, it is also too thin or flat over the other toes, and the upper leather over the heel and tendon Achilles is cut too straight; hence it is that at those points painful blisters of the feet most frequently occur. I would, therefore, say that it is quite impossible to make comfortable boots upon lasts that do not in the more important particulars resemble the feet, no matter what materials be used or what care may be taken in their manufacture.

So much for the shape, and now for the materials. That for the uppers should be fairly stout and very pliant crupp of the best quality, that for the soles well-seasoned, close-grained, bark-tanned cowhide. The style of boot most suitable for an infantry soldier is the laced ankle pattern usually called Blucher or Derby. The sole of the boot as now made is very faulty, and a fertile cause of some of the most painful forms of footsoreness, for, as the sole of the foot comes in contact with the ground at every step, a blister in that position at once disables, and even when a blister does not occur the sole of the foot may be so pressed upon and bruised by uneven or convex soles as to make progression very cramped and painful. The unevenness alluded to is most frequently caused by nails, or by the insertion of very unnecessary slips of leather or "filling" under the centre of the sole. The latter, which is generally responsible for the inner sole being convex on its upper surface, is of no use whatever, and is simply a fraud introduced for the purpose of giving the sole a fictitious strength and stiffness. We must, therefore, conconsider more in detail how this very important part of a soldier's boot should be made. Nails are required to protect the leather and afford the wearer a more firm foothold on slippery ground, but as they add to the weight of the boot and cut up the sole they should be as few as possible, and they should also be durable and not liable to fall out, as when the latter occurs the sole ceases to be watertight. The nails usually supplied do not fulfill

these conditions, they are also a frequent cause of the bumps or unevenness of the inside of the sole above alluded to. I would therefore suggest that the nails be of malleable steel, which would neither break nor wear out quickly, that their shanks be sufficiently long to pass right through the outer sole, that the outer sole be nailed before it is sewn on, and that the shanks or stems of the nails be turned down or clinched on its inner or upper aspect, thus effectually preventing the nails falling out of the sole or causing the lumps or unevenness above complained of. I would also recommend that after the stems of the nails had been so clinched the outer sole before it is sewn on should be thickly coated on its upper aspect with gutta-percha solution, and instead of a filling of slips of leather there should be placed over the clinches and gutta-percha coating a thin sheet of cork, such as cork soles are made of, which should extend as far as the line of sewing which attaches the sole to the welt. Soles made in this manner would be not only very durable, but quite waterproof and most comfortable, as the foot would have a perfectly flat and even surface to rest upon. The heels of our soldiers' boots should be broad and very low, cut down straight behind, and furnished with a few large nails of the same material and secured in the same manner as those recommended for the soles. Boots made in this manner are as comfortable as it is possible to make them without having lasts modelled exactly to the shape and peculiarities of the individual's feet for which they are intended, but as above stated this latter is not feasible for our soldiers, we must do what we can to make these fairly comfortable boots quite comfortable from the first, and fortunately this can be done by a very simple device. The new boot should be completely immersed in water for three or four days or until every part of them becomes quite soft and pliable ; the wearer should then wipe them out, and having put on his thickest pair of woollen socks he should put on his new boots and go for three or four hours' walk. If he keeps moving, even slowly, he will run no risk of getting chilled from wearing wet boots, which he will find quite comfortable and easy from the start, and at the end of his walk they will have taken the exact shape of his feet, which shape he should be very careful to preserve when he takes them off. He should then without delay proceed to pack them tightly with well-dried oats and put them away in a cool place so as to allow them to dry very gradually. When the boots have become dry the oats should not be removed from them, but the seams should be coated with molten bees' wax to protect the thread with which the boots are sewn, and then the whole of the outside of the boot should receive a thorough dressing of neat's-foot oil every second day for a week, winding up with a coating of curriers' dubbing. The oats may then be shaken out and the boots taken into use with the full assurance that they will be found most comfortable, damp-proof and more durable than two pairs taken into use in the ordinary way.

I recommend that our soldiers' boots be prepared for use in this manner for the following reasons : When the leather is quite new it is easily saturated with water, and in that condition is so soft and yielding that the boots after a few hours' wear become perfectly moulded to the foot and to the space which it occupies in the boot during progression, which space is longer than the foot itself, for the foot moves forward in the boot as we walk. In fact, no boot tree could be made that would so accurately mould the inside of the boot to what the foot really requires in the way of space as the foot itself. This shape is retained in all its details by the packing of dried oats, which latter, as it absorbs the moisture from the leather, becomes slightly swollen and fully counteracts the tendency the boot has to shrink or assume its original shape ; and to prevent the latter occurring after the oats have been removed the leather must be saturated with an animal fat, as above recommended, which will effectually prevent its ever again becoming saturated with water, with consequent shrinking, keep it soft and comfortable in wear, and render the whole boot most durable.—*Army and Navy Gazette.*

Reviews and Exchanges.

Tactical Studies.*

THERE are few more interesting events in recent military history than those that occurred in and about Plevna during the last Russo-Turkish War; and there is no more profitable method of studying them than that followed in this volume. Few descriptions of battles or campaigns descend to details, and it is the details of military operations that are most difficult to learn. The immense size of modern armies, the extent and scope of their operations and the rapidity with which action is carried on, all tends to exclude or obscure the minor but most important details of the movements; and so many tactical gems, and no doubt many tactical blunders are unrecorded. Captain von Trotha tries to avoid this in his studies on Plevna. He deals with every battle and action in detail, perhaps rather too much so. In his efforts at completeness and exactness he introduces into his narrative much historical matter not essential to a clear comprehension of the tactical problem under consideration. For instance that General Schilder-Schuldner was ordered on July 18th to occupy Plevna with two regiments, etc., etc. (43), is important: that the regiments were Archangel No. 17 and Wologda No. 18 is not important to the tactical student. Such surplusage only serves to irritate and distract one.

That General Schilder-Schuldner's force was entirely inadequate to the undertaking is evidence of neglect or incompetency on the part of some one in authority. The service of security and information must have been insufficiently performed, if performed at all. Otherwise a large hostile army could not have advanced for twenty days, through an open country directly upon the flank of the Russian advance without being discovered. But this Osman Pasha succeeded in doing with his army, and not only got within striking distance of his enemy, but actually intrenched himself there so effectively as to completely paralyze his adversary for months.

The Russian reverses at Plevna were all Russian. The Turks had very little to do with them. No doubt Osman Pasha was very much astonished at his success (34). His friend the enemy had permitted him to occupy a position in which he could do herculean service for his government; and then attacked him precisely as he would have wished, but hardly could have expected. If any consolation can be extracted from the statement, "That the repeated reverses suffered at Plevna helped toward the Russian final success" (34), the Russians are entitled to it. Actual war is an excellent school, and nothing sticks to the memory like a good beating. Still it is an expensive way to learn the elementary principles of the art. There are some things which can be learned only on the battle-field; but the principles of security and information can be learned in peace. The Plevna blunders look very much like the fruit of over-confidence. The Russian commander seems to have fallen into the not uncommon error of underestimating his adversary. Hence his careless advance and reckless attacks.

The geographical and topographical conditions of the Plevna problems are very fully described in Part III. and the map helps one to an understanding of the immediate en-

* *Tactical Studies on the Battles around Plevna, by Captain Thilo von Trotha.* Translated by First Lieut. Carl Reichmann, 9th Infantry, U. S. A. Hudson Kimberly Co., Kansas City, Mo.

vironment of the Turkish position; but the territory included in the map is too limited to give one a correct idea of the problem from the Russian point of view. The student needs to know not only the position to be assailed, but the approaches thereto.

The first attack, that of July 20th, is described and discussed in Part IV. It deserves to be carefully studied in order to know what ought to be avoided. Every movement was a mistake, and of course the result was a failure. It failed because it was undertaken with inadequate force; the force was inadequate because "The Supreme Command" was ignorant of the presence there of a large Turkish army: "The Supreme Command" was ignorant of that important fact because there had been practically no scouting or reconnoitring done in that direction. These are lessons that the Russians learned at a terrible cost.

The second attack, that of July 30th, was made in much greater force than the first one; but it also proved a failure. The reasons assigned are: 1st, want of coöperation between the wings of the attacking force (67), the weakness of the Reserve; the faulty formation of the lines of battle (68); the absence of skirmishers (69); and some others of less importance. Doubtless all of these contributed; but failure was a foregone conclusion. Why was the Turkish army attacked in that way? If Osman Pasha had commanded his adversaries they could not have acted more to his liking. What madness drives commanders to attempt manifest impossibilities? Is it an effort to accomplish by the valor of their troops what they cannot accomplish by their professional skill—or even help to accomplish? Or is it pride? Whatever it is, it ought to be accounted a crime. It is wasting the most precious treasure of the nation.

The investment of Plevna from the east, which involved several minor actions, was accomplished on August 31st, after some severe fighting. The author attempts to prove that at that time the Turkish army was as strong as the Russian. There is room however for doubt on that point. But if it were true it would only be additional evidence of the unskilfulness of the Russian general. To attack good troops, well posted and intrenched, with equal numbers, is a military blunder of considerable magnitude and might be considered a crime. But we hardly think that Osman's effectives could have equalled their assailants either in number or physical condition. Over two months in the trenches on short rations and drinking impure water during a Bulgarian summer, would sap the physical endurance of any army. It would be interesting to know how many of the 20,000 sick and wounded in Osman's army were actually sick and not wounded, and how many had died while he was in Plevna. Judging from experience the battle casualties of his army while in the trenches could not have been very great. To be sure he made several attacks in the open, and attempted several pursuits. But as a rule he fought behind his parapets. If one-tenth of the 20,000 were wounded men, we should consider the proportion high. Unfortunately all our books of reference are beyond our reach, and we are unable to decide.

The advance upon Lovtcha as described by von Trotha, who draws his facts from official reports, seems to have been somewhat irregular so far as the order of march is concerned, and the irregularity is difficult to account for. Can it be that the battalions had been so decimated by disease and the casualties of battle that, although their ranks had been filled, they were no longer trained troops? Organizations seem to have got mixed, and there is other evidence that officers were incompetent. The author gets unpleasantly excited over the fact that a captain of the staff acted as chief of artillery, and also as engineer. But a foot-note tells us that the captain was chief of staff to General Skobeleff, and therefore, presumably, acting under his orders. Still there must have been artillery officers there in abundance, and why General Skobeleff ignored their existence is difficult to explain.

In the attack upon Lovtcha the Russians were immensely superior in numbers to the Turks. The attack was frontal, poorly prepared, and the author thinks, unwise (91). He believes that equally good results could have been obtained by a turning movement, and at much less loss.

The grand attack on Plevna which opened with a bombardment of twenty 24 pounders and eighty-eight 9 pounders lasted from the 7th to the 11th of September; and, it is said, that the carriages of all the Russian guns were disabled by their own fire. Manifestly there must have been something radically wrong in the technical branch of the Russian artillery, for exactly the same thing happened at the siege of Kars. The particular defect is not stated, and again we miss our reference books.

After this prolonged preparation by the artillery, the infantry attack followed, and was a failure. The temporary success of General Skobeleff had no effect upon the fortunes of the day, and he was glad to withdraw from the redoubts he had taken, and heroically held during the night. The most interesting feature of this attack is the artillery preparation. An immense number of shell and shrapnel must have been thrown into, or at those Turkish redoubts, and the question naturally arises, What damage was done thereby? This question is unanswered. But judging from the ill success of the infantry attack, which seems to have been delivered with spirit and determination, the Turkish guns were not unserviceable at the end of the bombardment.

The reasons for this failure are rather obscure. The author says: "The details of the failure of the attack of the centre are still shrouded in obscurity" (128). As a matter of fact the attack as attempted was a practical impossibility, and nothing but pride and chagrin at previous defeats could have suggested it. Unless it can be proved that it was impossible to manœuvre the Turks out of their position, or starve them into surrender, the frontal attack on Plevna was not only a blunder but a crime.

The failure of the grand attack seems to have convinced the "Supreme Command" of the Russian army that he was sailing on the wrong tack. At any rate he abandoned the idea of a frontal attack and turned his attention towards the investment of Plevna from the west. Extensive cavalry operations with that object in view were undertaken with more or less success. The country behind Plevna was cleared up, and after some hard fought actions its complete investment was accomplished.

This was the beginning of the end. Disease and starvation fought for the Russians, Osman's troops began to desert, and from their reports and other visible signs an attempt to break out at an early date had been determined on. The attempt was made with considerable spirit, but it was hopeless. After some gallant fighting, in which Osman was wounded, the Turkish army surrendered.

We have not time to follow the author through all the details of the operations before Plevna. As already said, there is much in the book which, when viewed simply as a tactical study, might have been omitted. The student of tactics cares nothing for the official designation of regiments. Still the book is interesting, and when he has acquired the knack of skillfully skipping the jaw-breakers, will be instructive even to the student of tactics. The translation has been well done, although the strict literalism displayed in such a title as "The Supreme Command" might have been avoided.

JAMES CHESTER,
Captain 3d Artillery.

The Conduct of War.*

In one respect, at least, the condition of our own country and that of the German Em-

* *The Conduct of War.* A brief study of its most important principles and forms, by Baron Von der Goltz, Royal Prussian Lieutenant-General, unattached. Translated from the German by Joseph T. Dickman, 1st Lieutenant, 3d U. S. Cavalry, Assistant Instructor in the Art of War, U. S. Infantry and Cavalry School. The Hudson-Kimberly Publishing Co., Kansas City, Mo.

pire is analogous : both countries are fast losing the services of men who have had practical military experience. With thirty-one years separating us from our last and greatest war, and twenty-five years separating Germany from her last and greatest, the men who have made their names distinguished as practical exponents of the art of war are fast yielding to the inevitable march of time.

The tendency to allow theory to subvert practice is therefore one which is constantly before both countries, as younger soldiers,—energetic, ambitious, burning to distinguish themselves, as did their fathers before them,—are coming to the fore ; and their knowledge must needs be gained from books.

"The bare knowledge of the laws of strategy," says Von der Goltz in his introduction, "may therefore be of doubtful value. * * * Knowledge may even be the cause of fatal delusions. It easily betrays people into placing too high a value on the powers of the rules and precepts of the art of war, to produce victory, and none the less into an overestimate of their own talents. * * * In those armies where the commander is afforded the fewest opportunities to acquire practical experience, the number of those is great who imagine that they were intended for generals and who consider the practice of this vocation quite easy.

"However the need of a *précis* of strategy continues to exist. The young soldier, who desires to fit himself for the position of a commander, will not everywhere be offered the means to attain the coveted object, through his own efforts, in the manner indicated.

"The need of ascertaining what the leading rules of strategy requiring consideration are is then involuntarily forced upon the novice, who, without a safe guide, desires to learn the laws of his art out of books."

Laying aside the subject of mobilization and maintenance of armies, Von der Goltz deals with the activity of the masses of troops already deployed ; and, asking the reader to take for granted many assertions, the truth of which it is believed will later appeal to the practical side of his nature, the author treats the conduct of war in this work, as to general methods of using troops,—leaving the manner of application of the methods for a future volume.

This method of treatment naturally simplifies the subject matter.

As a part of the social life of nations, war is immovably fixed. Ministries may and do often settle controversies in a peaceful way, but it will never, until the millennium, perhaps, be impossible to entirely avoid these questions ; and courts of arbitration have in many cases, so far, led to little practical result, through lack of power to enforce respect for the decisions of the court. Disputed questions of possessions, jealousy and rivalry, power and influence, become too vast to be settled by diplomatic means, and war is the alternative. But peace is best preserved by thorough military organization,—the organization which makes all the intellectual and material resources of the nation available for the conduct of the war. War is not lightly declared when the damage to result from the encounter is appalling in its consequences.

Modern wars are bloody conflicts between nations,—not a mere manœuvring with a view to frighten the opponent into submission. Though a modern nation may begin with isolated encounters, or may at first throw only a part of its aggressive energy into the contest, it will be the exception rather than the rule in modern wars. Sooner or later the entire force will be drawn into it ; and in most cases will be alert from the start. War will then continue until the defeat of such a portion of the hostile forces as will induce the opponent to give up all chances of a later favorable turn to the campaign.

Modern strategy aims to deliver with united forces as decisive a blow as possible ; but the size of the force, thus united, is limited by the unwieldiness of the mass. The main army will, however, be the army for decisive action, and will be the immediate

objective on each side. Although separation of the groups composing an army will be necessary to secure mobility and proper facilities for subsistence and housing, decisive action will require rapid concentration.

War therefore appears to be a continual separating and assembling, which, even if no battles occur, will sooner or later become an annihilating power by its effect on the nation's commercial life. However, modern wars will always be an uninterrupted course of hostilities, and often, after the shattering of the main army, months may elapse before peace is coerced.* And when this stage is reached, much more will depend upon the endurance than the intensity of effort.

The author believes in the superior advantages to be gained, as a rule, by the offensive in battle, as compared with the defensive,—which latter is a dependent course of action ; and upon the strategical-offensive, to be followed, in most cases, by the tactical-offensive, as opposed to the combination of the strategical-defensive and tactical-defensive.

The strategical-offensive has a materially favorable effect on the *morale* of the troops, facilitates the mobilization and concentration of troops at selected points, and refreshes the troops by the constant change of scene and occupation. Still, the strategical-offensive has its great drawbacks in the way of the great demands that it makes on the troops. The strength of such attacks wanes the longer the line along which the attack is made ; and the force available for the last objective is often too weak for its purpose.

In the tactical-offensive, in addition to the elements which characterize the strategical-offensive, the numbers and character of the troops becomes of more importance ; but it is disadvantageous from the fatigues, incident to marching troops, the fact that their fire is interrupted, the absence of shelter, and the limitations as to time, within which an offensive attack must be made.

In a similar clear and entertaining style, General Von der Goltz discusses the Strategical-Defensive, the Tactical-Defensive, and the Alternation of Offensive and Defensive.

The remainder of the book consists of the discussion of operations,—operations in general, operations under the previously discussed conditions of strategical and tactical offensive and defensive operations under special conditions, and the influence of naval operations on the conduct of war.

"In pushing forward a base," says the author, "a fleet and a land force can support each other very well, whenever one side of the theatre of war borders on the sea. Of this the Japanese are at the present time giving us a very pretty example in their advance against China. At first, they occupied the disputed objective, Korea. Then, after a victorious combat, they crossed the border stream, Yalu. By this time, the distance between their army and the harbors of Korea where they had disembarked, had become moderately extended. The fleet then appeared with a second contingent of the army, in front of the fortified harbor, Port Arthur, situated at one side of the theatre of war, and took it. Afterwards, it captured Wei-hai-wei. In the further advance, these points offered support to the land forces. From their position, both these points command the great basin of the Gulf of Pechili. Provisions, ammunition, and reinforcements can be despatched to every port on the coast. An earlier appearance of the assailant would have exposed them to the action of relieving armies ; a later one would have missed its purpose."

The auther concludes the work with these words : "All the principles here elucidated and the forms portrayed are simple and easily comprehended. To be familiar with them is not a great scientific attainment, which, in the active affairs of war, could insure success. Every educated soldier knows them, but this does not make every one a capable general simply on that account. Only an exceedingly small number ever develop into really eminent leaders of armies. * * *

* The author cites Napoleon's Russian campaign, and the War of Secession.

"The execution will, however, still invariably require a strong mind and firm character; for only such an one will remain true to himself and to his convictions, in the stormy *struck* of warlike events. Power over men—which is denied to many an excellent man—is a further requisite; consciousness of purpose, and that difficultly definable talent of instinctively seizing all favorable circumstances, which in every-day life is called luck, are indispensable."

The translator, 1st Lieut. J. T. Dickman, 3d Cavalry, has admirably succeeded in combining conciseness with clearness in the translation; and in catching the meaning of the author in the technical discussions throughout the book. The index to the volume, a feature which is invaluable to the student, is the work of the translator.

The enormous amount of work entailed upon the translator of even such a little volume as "The Conduct of War," in the way of translating, revising, indexing, and proof-reading; and the meagre financial returns due to its necessarily limited sales, makes such an undertaking a "labor of love." The translator is to be congratulated upon the thorough manner in which he has performed his task.

CHARLES D. RHODES,
2d Lieutenant, 6th Cavalry.

Thoughts on Modern Tactics.*

This collection of remarks, or, as they are termed here, "thoughts" on modern tactics which have been published from time to time are now brought together and presented in pamphlet form. The subjects of the different chapters have no direct connection with each other but all relate to the general subject.

The name of the author is sufficient guarantee that his remarks are worthy of careful attention. He does not profess to have solved any of the questions which he has considered, but simply to give his ideas "on reviewing the present condition of tactics with the experience that the past few years have brought both from our teachings at home and from the lessons to be gathered from a study of the manœuvres and military literature of other nations."

The "Tactics" referred to is that of the three arms "in union." The subject is treated by means of a few remarks on the tactics of each arm, which are discussed, not as problems which he professes to have solved, but as questions which a student might submit to brother students for such solution as may seem to them possible. How well he has attained his object of making others think, a brief note of some of the salient points of his articles may show.

The first thought is relative to the usual text-book definitions of the terms Strategy and Tactics; which in consequence of their so merging one into the other that it is difficult in reality to tell which is which, it is questioned whether it "is not safer to regard these two great principles of war as twin sisters, strategy the elder born." The next consideration of the author is attack and defense; while he recognizes that the attack is the surest road to success, to attack, he claims, there is one thing absolutely necessary, superiority either physical or moral, and if this is wanting a defensive attitude is forced, not the passive defensive, however, but the defensive-offensive. This condition requires peculiar characteristics and discipline, and the thought might be extended by the query, how shall this be attained? In the chapter headed Cavalry, the author makes his acknowledgment of the value of this arm in the opening lines "Who is there who has had command of a force in the field and has not felt his primary dependence for success to rest on his cavalry? To fight without cavalry is to fight as a man blindfolded." Due to the present conditions of war this is now more than ever true; the work becomes more exacting and be-

* *Thoughts on Modern Tactics.* By Major-General H. M. Bengough, C.B. Gale and Polden. Aldershot.

set with greater difficulties, but at all times the cavalryman should be so trained as never to forget his purpose and be tempted into some *melée* which may entirely defeat his object, not that cavalry is not to fight, but it has other very important duties, as reconnaissance, which may be entirely defeated by so doing.

After stating the principles which govern the use of modern artillery, is the following: "That which is perhaps of the most general interest to the service is the principle that artillery in the attack must not shun the closest quarters, must not hesitate to risk the loss of guns when the critical stage of a battle is reached, * * * that is to say when the infantry are within decisive rifle range of the position and are ready for the assault." While such a move might be considered as a false tactical use of the arm, yet the author believes that all will be compensated for by the encouragement to the attacking infantry due to the moral factor. The next question considered is as to the best position of the guns when everything is normal, which he has well reasoned, it might be amplified by the thought of other cases, that is when things are anything but normal.

In regard to infantry he says, "The principles of infantry tactics are established; the forms which are most advantageous to give effect to these principles are yet to seek." A suitable formation for all the varying conditions of an infantry attack is hardly attainable, but one may be obtained that violates the fewest of these principles. Relative to the advisability of maintaining a support near the firing line he quotes the results of some peace experiments which go to show that under similar conditions such formation would be impossible, what the result would be in actual war cannot be known until it is tried, but it certainly would afford a great moral support to the firing line, whether so great as to justify the probable loss is a question for more thought. In his remarks on savage warfare, which has but little application for us now, there are a few statements that should be taken to heart by those who seem to think the extended order the only fighting formation for infantry; it is in effect that the practical application of tactical principles varies according to the weapons employed. Solid formations have given way to extended order in consequence of modern rifle fire, but against a badly armed enemy whose attacking power depends mainly on shock, a formation which affords resistance, combined with an effective use of the rifle naturally commends itself. At the conclusion of the chapter on Engineers is a statement that might lead to thought by some of our own people, it is, "he should remember that he is a soldier first and an engineer afterwards."

The reference to railways only applies to tactical action in the battle-field. The great object of their use is to gain time and rest the men, dependent upon the time required to entrain and to the speed of the train there is a limit of distance, less than which it would be useless to use the railways; for infantry this is figured out as any distance, for cavalry and artillery but little would be gained for distances under ten miles.

Relative to wood operations he concludes that the tactical bearing of woods differ as greatly as ground, but they all have this important military feature in common, that "they obstruct view and therefore to a greater or less degree fire, and they make the direction and touch between units difficult to maintain." For such action he recommends a line of sections in columns of fours, based on the idea that "the essential conditions that any such formation must fulfil may be said to be handiness of leading and readiness to form to front or flanks."

In the final chapter on manœuvres he states that "umpiring has become a science, and manœuvres have become as realistic as practically the absence of bullets will permit, yet troops move with a freedom that could not occur in war; flanks are exposed, and reserves expended"; this we might well make note of in our extended order drills. It is suggested as a partial correction (especially for the uncertainty of numbers) that part of the force be kept neutral and attached to either side, or by the use of flag units.

There is much more to the book, and the more carefully it is read, the better its object seems to be attained, *i. e.*, "Thought." J. F.

Camps, Quarters, and Casual Places.*

The well-known correspondent and author, Mr. Forbes, has collected in book form many short articles, some of which have appeared previously in the *Nineteenth Century*, *Contemporary Review* and *McClure's Magazine*.

As a chronicler of battles his distinguished merit has been fully recognized. "The Warfare of the Future" gives us his idea of what this will become, based partly on his own experience and in part on proving-ground tests of modern arms, modified by such results as past experience and autumn manœuvres may afford.

"At first sight the proposition may appear startling and indeed absurd; yet hard facts, I venture to believe, will enforce the conviction on unprejudiced minds that the warfare of the present when contrasted with the warfare of the past is dilatory, ineffective, and inconclusive." This is his text or leading idea and what follows is an amplification supported by examples from various wars since 1860 both in our own country and abroad.

"Considering the extraordinary advances since the end of the smooth-bore era in everything tending to promote celerity and decisiveness in the result of campaigns,—the revolution in swiftness of shooting and length of range of fire-arms, the development in the science of gunnery, the increased devotion to military study, the vast additions to the military strength of the nations, looking to the facilities for rapid conveyance of troops and transportation of supplies afforded by railways and steam water-carriage, to the intensified artillery fire that can now be brought to bear on fortresses, to the manifold advantages afforded by the electric telegraph, and to the crushing cost of warfare, urging vigorous exertions toward speedy decision of campaigns—reviewing, I say, the thousand and one circumstances encouraging to short, sharp, and decisive action in contemporary warfare, it is a strange and bewildering fact that the wars of the smooth-bore era were, for the most part, shorter, sharper, and more decisive." If we can accept this statement fully there is much food for thought contained therein, especially for our friends of the National Guard, who would end such wars as we may in future enter upon within the nine months' term allowed them by law. Assertions are easy, our author declares, but they go for little unless they can be proved, and he proceeds to furnish examples in support of his contention.

The Prussians are proud, and with reason, of what is known as the "Seven Weeks' war of 1866," but what of Napoleon's campaign, which began October 9, 1806, and ended with his entry into Berlin on the 25th of the same month, the war ended and all Prussia at his feet? Which was the swifter, the more brilliant, and decisive—the campaign of 1866 or that of 1806?

Again, the Franco-German War is generally regarded as an exceptionally effective performance on the part of the Germans, but what of Napoleon's campaign of 1809? He assumed command on the 17th of April, having hurried from Spain. He defeated the Austrians five times in as many days and was in Vienna on the 13th of May. Hostilities ceased with the armistice of Znaim on the 11th of July, and all this without the aid of those accessories so necessary to expedite the movement and supply of modern armies—no railroads, no telegraph, almost no mechanical aids.

So also the Russians. They have a reputation for good marching and certainly Suvaroff made good time in his long march from Russia to Northern Italy in 1799, almost as good, indeed, as Bagration, Barclay de Tolly and Kutusoff when falling back before Napoleon in 1812. But have they improved either in marching or fighting at all com-

**Camps, Quarters, and Casual Places.* By Archibald Forbes. New York: The Macmillan Company. $1.75. 12mo.

mensurate with the improvement of appliances? In 1877 they crossed the Danube the 21st-27th of June and the treaty of San Stephano was signed the 3d of March, 1878; eight weary months had they taken to cover the distance between the Danube and the Marmora. But fifty years earlier a Russian general, Diebitch, had marched from the Danube to the Ægean in three-and-a-half months, nor was his journey by any means a smooth and bloodless one.

And so our author goes on adding parallel to parallel in support of his contention.

"Magazine and machine guns would seem to sound the knell of possible employment of cavalry in battle. No matter how dislocated are the infantry ridden at, so long as they are not quite demoralized, however *rusé* the cavalry leader."

For "never more will French infantry (nor any other) shoot from the hip as Lafont's conscripts at Mars-la-Tour shot in the vague direction of Bredow's squadrons."

Fortifications, too, will differ curiously from those of a past time. In these the defender will no longer be "enclosed in the toils imposed by the engineer" while the besieger enjoys the advantage of free mobility.

"In conclusion, it may be worth while to point out that the current impression that the maintenance by States of bloated armaments is a keen incentive to war, is fallacious."

There is the grim certainty of heavier and yet heavier expenditure after the war. Therefore the potentates show reluctance to draw the sword, and rather bear the ills they have than fly to those inevitably worse in character.

The purely literary side of the book is well exemplified in the pretty and sad story called "Matrimony Under Fire."

Our author's topics are many and various. One may read "A Version of Balaclava," "The Inner History of Waterloo," "How I Saved France," "The Lucknow of To-day," etc., and no one reading him will fail either of interest or instruction.

The Yellowstone National Park.*

About twenty-six years ago a company of gentlemen were encamped at the forks of the Madison River in what is now the Yellowstone National Park. They had just finished the first complete tour of exploration ever made of that region. Fully realizing the importance of all they had seen, they asked what ought to be done to preserve so unique an assemblage of wonders to the uses for which Nature had evidently designed them. It required no argument to show that government protection alone was equal to the task and it was agreed that a movement to secure such protection should be inaugurated at once. So rapidly did events develop along the line of this idea, that within the next eighteen months the "Act of Dedication" had become a law, and the Yellowstone National Park took its place in our country's history.

The widespread interest which the discovery of this region created among civilized peoples has in no degree diminished with the lapse of time, and now that matters legislative and administrative give firm assurance of the continued preservation of the park, the time seemed to our author opportune to collect the essential facts, historical and descriptive, relating to this region, and to place them in form for permanent preservation. The present literature regarding the park is unfortunately widely scattered, somewhat difficult of access, and in matters of early history, notably deficient, and Captain Crittenden is fortunate in being able to collect his facts directly from actors in the earlier scenes of exploration.

For the park has not been fully disclosed to the civilized world so long but that many who aided in its early exploration are still living. Though long before their time its

**The Yellowstone National Park. Historical and Descriptive.* By Hiram Martin Crittenden, Captain Corps of Engineers, U. S. Army. The Robert Clarke Company, Cincinnati, Ohio.

wonders had been known to those hardy trappers who hunted through this region, notably Colter, who separated from Lewis and Clark's expedition in the summer of 1806.

David Thompson, explorer and geographer, seems to have been the first to mention the name Yellowstone in 1797 though the explorer Pierre de Varennes, 1738-1753, appears to have claims to first applying the name Roche Jaune. Lewis and Clark used the term Yellowstone in 1805.

Like their successors they simply translated the Indian term signifying "Yellow Rock," which these people had applied for a very evident reason.

A clear account of the Indian occupancy of the region and the early knowledge received from these Indians by army officers and others follows the history of the name.

Lewis and Clark found the traders of that rival of the Old Hudson Bay Company, the North-west Fur Company of Montreal, among the Mandans in 1804, and these and Mr. Astor's traders doubtless knew this wonderland though little of their knowledge ever reached the outside world.

Of the earlier characters whose names are closely linked with the history of the Yellowstone, the most distinguished is James Bridger, a sketch of whose life is given in this interesting volume. His personal knowledge of the region is believed to date from about 1824. In his efforts to disseminate a knowledge of its wonders Bridger met only with ridicule. No periodical would lend itself to his service, and the persistent incredulity of his countrymen was long a cloud upon the old hunter's life.

Interesting chapters follow regarding the full discovery and exploration of the park, its flora, to which is added a complete and entertaining description of its various points of interest.

In describing a region whose fame rests upon its natural wonders, the assistance of the illustrative art has of course been resorted to. These illustrations cover every variety of subject and are abundant in quantity and of excellent quality.

The book is handsomely gotten up, is clearly printed and possesses a complete index.

Field Artillery.*

Since the last edition of this excellent work was published in 1890, the equipment and organization of the British field artillery have been completely changed, and a uniform and generally satisfactory system of fire tactics and fire discipline has been established.

Scarcely any change has been found necessary in the tactical portion of the volume, but the rest has been brought up to date. It long ago became an established text-book for the Staff College and Promotion Examinations.

Colonel Baker wisely points out that the present is a time of transition and of constant change in the organization and equipment of field artillery.

* *Field Artillery, its Equipment, Organization, and Tactics.* By Lieut-Col. Sisson C. Pratt. Revised by Lieut-Col. Edw. Baker, R. A. Sixth Edition. Kegan Paul and Co., London, England.

Publisher's Department.

THE **American Ordnance Company of Washington, D. C.,** has issued a carefully prepared pamphlet, fully illustrated, descriptive of the various forms of breech mechanism controlled by this firm, which includes successful American experts who are fully qualified on account of capital, experience and energy to supply ordnance wants, great or small.

The mechanism in type A replaces the former one in the Hotchkiss drop-block. The block is opened and closed by the crank actuated by the exterior crank handle. The rocking shaft carries the hammer and has a toe which, when struck by the cocking cam on the crank, turns the rocking shaft and retracts the hammer. A cocking toe on the hammer presses down the mainspring sleeve and compresses the mainspring. When at full cock the firing system is caught by the sear, which is actuated by the sear spring.

During this portion of the movement of the crank the breech-block does not move, but as soon as the hammer is cocked the block commences to descend, and as it moves down, the extractor is moved directly to the rear—slowly at first, with a powerful leverage to start the cartridge case from its seat, and then quickly as the bore is unmasked. When completely down, the breech-block is caught and held by the stop-bolt.

The principal modifications in this mechanism from the former type are the following:

1st. Substitution of spiral springs completely hidden in the block for exposed leaf springs.

2d. An improved and simplified form of firing point in the hammer.

3d. An independent extractor nib having a spring action, gaining in force of extraction and strength of extractor.

4th. An improved stop-bolt.

5th. An improved connection of crank handle to the crank axle.

The Driggs-Schroeder Breech Mechanism.—This system, so well and favorably known in our Army and Navy, hardly needs extended reference.

The Fletcher Rapid-Fire Breech Mechanism.—The breech-block is of the slotted-screw type, having four screw sectors in the smaller calibres. It is uncocked, withdrawn, and swung open by the single swing movement of the opening lever.

The percussion-firing mechanism lies in the axis of the breech-block. Normally it is always uncocked and the point of the firing pin held back clear of the cartridge primer. The act of pulling the firing lanyard both cocks and trips the firing pin. Thus, with field

artillery especially, there is absolute safety in moving the gun from one position to another when loaded, as the firing mechanism lies dead until cocked by the act of firing.

The Dashiel Rapid-Fire Breech Mechanism.—This breech-block is also of the slotted-screw type, having four screw sectors in the smaller calibres. It is supported and centred both in and out of the gun on the axial hub of a carrier plate which is hinged on the left side of the breech, and which covers the entire breech opening. The hub permits rotation of the block whilst maintaining it in its axial line.

The blanks of the housing and those of the block are cut away on curves struck from the hinge-pin as a centre to permit the block to be swung directly out of or into the housing without any direct withdrawal motion.

In the blank of the breech-block which lies toward the hinge-pin a plain spiral groove is cut to receive the toe of the operating lever, so that when the lever is swung to open the breech this toe rotates the block and unlocks it. When the block is unlocked this toe meets an abutment at the end of the groove, so that further movement of the lever causes the block and carrier to rotate about the hinge-pin and unmask the bore. The movement of the operating lever is a single swing.

By means of a stud on the sear engaging with a circular groove in the back of the breech-block the trigger and sear cannot be moved until the breech is fully closed, nor can the firing pin by any possibility reach the primer until by locking of the breech-block the cocking cam is moved from in front of it.

The Hotchkiss Automatic Machine Gun Mechanism.—The gun-barrel is screwed into the breech casing, and directly under this barrel a cylinder is secured at its front end to the barrel by a band and at its rear end to the casing. The front end of this cylinder forms an expansion chamber for powder gas escaping through the hole in the barrel. This escaping gas drives back the piston until the exhaust hole is uncovered, when the gas escapes to the air.

In the lower part of the breech casing lies a long mainspring whose rear end seats against the casing, whilst the front end bears against an abutment of the piston. This spring drives the piston forward again after the action of the powder gas. In driving forward, another part of the piston causes the firing of another cartridge, and thus an automatic reciprocating motion of piston is created between the gas and the spring pressures. The rear end of the piston is of peculiar shape to enable it to actuate the subsidiary parts necessary to feed, load, fire, extract, and eject.

Extraction and ejection of the cartridge case is accomplished by means of an extractor and ejector of the common general type found in small arms. Feeding is mainly accomplished by action of a spur-wheel whose cogs project through the feed-table. This wheel is actuated positively by means of a guide and cam on the piston which so work the wheel that it brings the cartridges successively into line with the bore and holds them there rigidly until the breech-block forces them home. The cartridges are assembled in light brass feed-plates holding thirty each, the plates being so made that they may be hooked to each other when continuous firing is desired.

To start the firing the piston is pulled back by hand by means of the small grip and is

caught by a trigger. A clip of cartridges being inserted, the trigger is pulled and as long as it is held back firing continues. Firing is stopped by releasing the trigger, and when stopped the barrel is always in unloaded condition.

The Hotchkiss Sliding Block-Breech Mechanism.—The breech-block has a horizontal sliding movement and is locked and unlocked by the locking screw actuated by the handle. In prolongation of the locking screw, a helical cocking cam, having a contrary pitch to that of the screw, engages with the cocking stud on the side of the spring box, so that when the locking screw is turned to unlock, the spring box is retracted and the mainspring is compressed. The hammer is journaled in the front of the breech-lock and carries a tooth which gears with two teeth on the spring box, so that when the latter is retracted the hammer is thrown back. The trigger piece, against which the mainspring bears, is held in the block by a bayonet joint in such a manner that it can revolve slightly without being unlocked. On this piece is formed a sear, which engages with a notch on the spring box, and when the breech is unlocked a shoulder on the base of the handle strikes a lug on the trigger piece, causing the latter to revolve until the sear engages with the notch on the spring box and the toe is brought in contact with the stud on the breech-block. The block is then pulled from its seat.

When closed and locked the spring box is held against the mainspring by the sear alone. The lanyard hook is then caught between the toe and stud, and when pulled the toe is revolved sufficiently to trip the sear.

* *

Royal Baking Powder and the Secret of Its Success.—"Royal Baking Powder" is a household word pretty much the civilized world over, and the article itself has become a necessity in thousands upon thousands of families in nearly every civilized country. Much of the success of this splendid preparation is due to judicious advertising, but in greater degree its success is due to the fact that it is exactly what it is represented to be. One of its great recommendations is its high leavening power. That, of course, appeals to every housewife. It secures a light baking with the least amount of attention and trouble. It can be counted upon. But it has a virtue beyond that—its virtue of virtues lies in the fact that it is "absolutely pure." Royal Baking Powder contains nothing deleterious. It can be used with perfect confidence, and with the certainty that, so far as it is concerned, the baking will be thoroughly wholesome. It has been subjected to the most searching analyses, and pronounced free from impurities or chemical ingredients that are harmful to the system. By adhering honestly and conscientiously to their formula, the manufacturers of Royal Baking Powder have established for it a reputation that has made it, as it were, a great staple. It is a boon to the housewife and the cook, and a reproach to all that would adulterate food products in any manner, shape, or form. In short, it is a perfect baking powder, in that it combines the highest leavening power attainable with purity in the highest degree.

* * *

Popular Music.—Few people outside of the service, or for that matter in the service either, are aware of the amount of material contributed yearly to science, literature, mu-

sic and the arts, by the personnel of the Army and Navy. In the realm of music especially, the Army and Navy boast of a number of composers, whose works have found ready recognition from the music loving public. Among the latest publications received by the Institution are the **"Marse Henry" March,** dedicated to Mr. Watterson, the genial Marse Henry of the Louisville *Courier-Journal*, **composed by A. La Guardia, the Bandmaster of the 11th U. S. Infantry,** and two bright and catchy **Two-steps by Chas. A. Zimmerman, the well-known Leader of the Band at the U. S. Naval Academy.** They are entitled **"Princeton University"** and **"The Severn"** respectively, the latter being dedicated to the class of '97 of the U. S. Naval Academy. Neither **Mr. La Guardia** nor **Mr. Zimmerman** are novices as composers and we risk the prediction that their reputation as musicians will be greatly enhanced by their latest works, which are of a high order of merit and apt to become decidedly popular. All three compositions are published by **The Rudolph Wurlitzer Co., of Cincinnati, O.,** who are our oldest advertisers in the JOURNAL, having been with us without interruption for more than 15 years, and they deservedly seem to enjoy a large portion of the trade of the Army and Navy.

Prize Essay—1897.

I.—The following Resolution of Council is published for the information of all concerned:

Resolved, That a Prize of a Gold Medal, together with $100 and a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest, the subject to be selected by the Executive Council, and $50 to the first honorably mentioned essay. The Prizes will be awarded under the following conditions:

1. Competition to be open to all persons eligible to membership.

2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary *on or before September* 1, 1897. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.

3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate *the Essay deemed worthy of the prize;* and also in their order of merit those deserving of honorable mention.

In determining the essay worthy of the prize, the Board will be requested to consider its professional excellence, usefulness and valuable originality, as of the first importance, and its literary merit as of the second importance. Should members of the Board determine that no essay is worthy of the prize, they may designate one or more essays simply as of honorable mention; in either case, they will be requested to designate one essay as first honorable mention. Should the Board deem proper, it may recommend neither prize nor honorable mention. Should it be so desired, the recommendation of individual members will be considered as confidential by the Council.

4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.

5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Sept. 11, 1896, for the Prize Essay of 1897, is

"BASED ON PRESENT CONDITIONS AND PAST EXPERIENCES, HOW SHOULD OUR VOLUNTEER ARMIES BE RAISED, ORGANIZED, TRAINED AND MOBILIZED FOR FUTURE WARS."

III.—The gentlemen chosen by the Council to constitute the Board of Awards for the year 1897 are:

GENERAL WESLEY MERRITT,
GOVERNOR U. A. WOODBURY,
COLONEL H. W. CLOSSON.

JAMES FORNANCE,
Secretary.

GOVERNOR'S ISLAND,
Nov. 1, 1896.

The Military Service Institution.

President.

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Membership dates from the first day of the calendar year in which the "application" is made, unless such application is made after October 1st, when the membership dates from the first day of the next calendar year.

"*An Entrance Fee of Five Dollars* ($5) shall be paid by each Member and Associate Member on joining the Institution, which sum shall be in lieu of the dues for the first year of membership and on the first day of each calendar year, thereafter, a sum of not less than *Two Dollars* ($2) *shall be paid as annual dues. Annual dues* commence on January 1st in each year."

NOTE.—Checks and Money Orders should be drawn to order of, and addressed to, "The Treasurer Military Service Institution," Governor's Island, New York Harbor. Yearly dues ($2 00) include Journal.

Changes of address should be reported promptly.

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